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ABSTRACT

Instruments and manuals prepared for those conducting the research of the IEA project comprise Volume II of the final report of the 18-nation study of educational attainment at the elementary and secondary school levels. Section 1 includes technical research guidelines for national centers, school coordinators, and test administrators. Section 2 is comprised of science test booklets and questionnaires. Section 3 includes testing instruments for reading comprehension and literature in the mother tongue. Section 4 is comprised of all word knowledge tests, student questionnaires and attitude and descriptive scales, teacher questionnaires, and the school questionnaire. Section 6 contains descriptions of participants in the IEA (including council members, full-time staff, consultants, international committee members) and of the institutions, technical officers, and committee members for each of the nations participating in the project. Related documents are Volume I, (EA 002 594) and Volume II, section 5 (FL 001 477). [Some illustrations may be of poor quality when reproduced.] (JK)

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FINAL REPORT

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CROSS-NATIONAL STUDY OF EDUCATIONAL ATTAINMENT:

STAGE I OF THE I.E.A. INVESTIGATION IN SIX SUBJECT AREAS Volume II

Prepared by

Participants in the International Project
for the Evaluation of
Educational Achievement (I.E.A.)

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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February 1969

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EA 002 615

VOLUME II

Instruments and Manuals

Booklet 1	Manuals	(Green Cover)
Booklet 2	Science Tests	(Pink Cover)
Booklet 3	Mother Tongue Tests	(Blue Cover)
Booklet 4	Word Knowledge, Tous, Questionnaires, Attitude and Descriptive Scales	(Yellow Cover)
Booklet 5	French as a Foreign Language English as a Foreign Language Civic Education	(In Separate Volume)
Booklet 6	Information on IEA	(Red)

ED034300

INTERNATIONAL ASSOCIATION
FOR THE
EVALUATION OF EDUCATIONAL ACHIEVEMENT
(I.E.A.)

PHASE II STAGE 2

MANUALS

1 - For National Centers

2 - For School Co-ordinators

3 - For Test Administrators

December, 1968

c/o UNESCO INSTITUTE FOR EDUCATION, HAMBURG

In this Bulletin are the three Manuals.

Manual 1 is for National Centers

Manual 2 is for School Co-ordinators

Manual 3 is for Test Administrators

Note that Manual 3 is written in three sections, namely Population I, Population II and Population IV. The page numbering is within sections. However, the paragraph numbering goes across sections. This has been done so as to minimize errors when and if errata to Manual 3 are sent out. If National Centers do not change the paragraph numbering, then test administrators for Populations II and IV should be informed not to worry about the missing paragraphs.

Further please note that changes should be made in the directions on the front cover of some test booklets to correspond with that which the test administrator reads as directions from Manual 3.

If you have any queries, please do not hesitate to contact the Co-ordinator in Hamburg.

I.E.A.

PHASE II Stage 2

Manual for National Centers (IEA/M1)

Manual 1.

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SECTION I

ASSUMPTIONS TO MANUAL 1

In writing this Manual, the following assumptions have been made:

1. That there will be a Stage 3 for the testing of Civic Education, English as a Foreign Language and French as a Foreign Language. This document deals only with Stage 2, i.e., it is assumed that all countries will be testing Science with or without Mother Tongue (Reading Comprehension with or without Literature) It is further assumed that all countries will administer the short Word Knowledge test and appropriate questionnaires and attitude and descriptive scales. As a national option National Centers may also administer some other measure of scholastic ability; the scores on such an additional test are to be reported in stanines.
2. That answer cards are used to collect information from students (except for Booklet 2 - See Page 22) and teachers. (Note: National Centers not using answer cards must make appropriate changes in their procedures for items 1 to 10 of Section V.)
3. That a form (Student Name Form) is used to obtain the names of all students falling within the defined target populations. Note: in large schools where there are likely to be more than 40 students in a given target population, a sub-sampling procedure should be followed. (See Page 6)
4. That schools are sent a form (Teacher Name Form) for obtaining the names of all teachers who are teaching the subjects being tested in that school for at least 5% of their teaching load. (Note: a teacher here is defined as a person giving instruction in the subject being tested, whether he is certified to do so or not.) This form will be used for indicating which documents are to be sent to which teacher.
5. That a Student Envelope is provided for containing all the documents to be used by a particular student. If deemed necessary, more than one Student Envelope may be used to ensure the privacy of the returns.
6. That a Teacher Envelope is provided for containing all the documents to be used by a particular teacher and a Teacher Return Envelope is also provided for returning a particular teacher's answer card to

the National Center.

7. That a School Coordinator (in some case a single individual may serve as a coordinator for several schools) responsible for the testing program within each school will be appointed. In some instances this may be the School Principal himself. In Manuals 1, 2, and 3 all references are made to the School Coordinator.

8. That there will be individuals (in most countries, teachers) who will be responsible for the actual supervision of the testing sessions.

9. That the sampling proposals have been approved.

10. That all documents to be used for Stage 2 will have an identification number (see Appendix I to Manual 1).

11. It is further assumed that the testing program will be divided into separate sessions, and furthermore that separate booklets will be compiled of the tests, questionnaires, attitude scales, etc. which will be used in the different testing sessions. (See details on pages 22 - 25)

    Note: If any of the assumptions mentioned here are not accepted by a National Center (e.g. the use of Student Return Envelope) then alternative procedures to achieve the same ends must be devised by the National Center.

12. It is assumed that not more than 999 schools will be tested in any one country, and that each school will be given a unique number between 001 and 999. If more than one population is being tested in a single school, then the school identification number is the same for the several populations. Only one School Questionnaire need be produced. NOTE: If only one population is being tested in a school, punch the population number in column 8 of the school cards (A,B,C,) If more than one population is being tested in any school, LEAVE THIS COLUMN BLANK.

    Only one set of teacher cards needs to be completed in any one school. If only one population is being tested in that school, then the identification column on the MRC card (card 11) will have the appropriate population number punched. If more than one population is tested in a school, then column 8 should be blank. In order to avoid printing unnecessarily large numbers of teacher cards, National Centers should state in which schools more than one population is being tested, when they send in details of their samples. However, it remains the responsibility of the National Center to ensure that one and only one set of teacher cards is sent to each school.

The Special School Science cards for measuring the "opportunity" to learn the specific items on the Science tests are to be filled out separately for each population. For example, if Populations II and IV are being tested within a single school, the Science teachers might meet on two occasions. On the first occasion they would rate the items as the Population II Science tests and on the second they would rate the items in the Population IV tests.

SECTION II

SAMPLING

Sampling of Schools for the Dry Run

The dry run is a rehearsal, but not a dress rehearsal. Its main purpose is not to obtain accurate estimates, but to enable us to go through all the processes of collecting the evidence and subsequently analysing it in order that we may discover, and remedy, weaknesses in our present plans for the main survey. None the less we should aim at being as accurate as we can for the very modest expenditure of time and money that we contemplate.

This means that our samples of schools should be small, of the order of ten schools per population. If in the main survey two or more populations are to be tested in the same schools the dry run should follow this pattern. Since the schools will be few they should be selected by judgment. Samples chosen by good judgment can be more representative than probability samples when the number of primary units is small. Except for a bias in favour of large schools for reasons given below we should aim at making the selection as representative as possible. In other respects we should aim at making it as representative as possible by including as many of the school types and neighbourhoods as we can. With ten schools we can cover ten stratifications (classifications and cross classifications) with one school per stratum. The choice of the best ten stratifications to cover is a matter for individual judgment according to the circumstances of each country. There is no special virtue in ten; circumstances may indicate that eight or twelve would be better, but in any case the number should be the smallest that will bring out the main contrasts and give some indication of the variation between schools to be expected in the main survey. There are two alternative reasons for a bias in favour of large schools. The first is that in countries where the design for main sampling includes the sub-sampling of students in large schools (as suggested in the section below), the bias will provide more opportunities for National Centers and for the schools to practice this technique. The second is that in countries that do not intend to sub-sample, the bias towards large schools will increase the information available for dry-run on the computer.

Should the schools for the dry run be chosen from those that have already been selected for the main survey, or should they be chosen from outside this group? There are arguments on both sides, which may have different weights in different countries, and there is no need for all countries to adopt the same policy. However, it is strongly recommended that schools selected for the dry run testing be different from schools used in the main testing.

Sampling, Sub-sampling and Weighting.

Since it has now been decided that in 1970 we shall be concerned only with Science, Reading Comprehension and Literature, and that all students in a sample shall take all the tests, the packing and pairing arrangements are no longer needed. We can put down for testing every student in schools of small or moderate size. It is reasonable to regard schools with a relevant population of up to 40 students as falling within this description. If we took every student from a school with a population much greater than 40, we should be testing more than we need from that school. We could avoid this by taking only half the students where the population is between 41 and 80, a third where it is between 81 and 120, and so on, with compensation by giving the student a weight of 2 where the sub-sampling fraction is half, of 3 where it is a third, and so on. This would be a fair design, but it would be inefficient, because unequal weights increase the standard errors, and are therefore to be avoided as far as possible. This means that while unequal weights may finally be needed, because the execution deviates to some extent from the design, they should not be deliberately introduced at the design stage. To avoid them we can couple the sampling fraction for schools with the sub-sampling fraction for students within schools, keeping their product, which is the sampling fraction over all, constant. If we do this we give every student in the population the same chance of being drawn for the sample, so that all students who are drawn have the same weight. This is equivalent to splitting large schools into two, three or more parts, and giving to each part the same chance of being drawn that a small school has. Alternatively we may regard it as giving the large schools two, three or more tickets in the draw, whereas the small schools have only one ticket. If one of the tickets of a three ticket school is drawn, a third of the population of that school will appear in the sample. We can put this scheme down formally as follows:

		Sampling Fractions		
Size Group	Measure of Size	For Schools	For Students within Schools	Over All
Up to 40	1	f	f'	ff'
41 - 80	2	$2f$	$\frac{f'}{2}$	ff'
81 - 120	3	$3f$	$\frac{f'}{3}$	ff'
etc.	etc.	etc.	etc.	etc.

The essential point is that the product of the two sampling fractions should be the same for all size groups. There is nothing sacrosanct about the particular size groups used in the illustration above, nor is it essential that the measures of size should be very accurate. This is important, because it may be hard to obtain exact information about size in advance. The general scheme is :

		Sampling Fractions		
Size Group	Measure of Size	For Schools	For Students within Schools	Over All
1	M_1	$M_1{}^{f}$	f'/M_1	ff'
2	M_2	$M_2{}^{f}$	f'/M_2	ff'
3	M_3	$M_3{}^{f}$	f'/M_3	ff'
etc.	etc.	etc.	etc.	etc.

The conditional probability that a student is drawn, given that his school has been drawn, is inversely proportional to the measure of size. But the probability of the school being drawn is directly proportional to the measure of size. Therefore the measure of size does not appear in the total probability of the students being drawn, so that all students have the same weight. Furthermore, the weight of the school is proportional to the number of students drawn from it, and not to the number it contains. The compensation for this is of course that there will be relatively more large schools in the sample than in the population.

To make the draw, the measure of size can be entered against the name of the school in the stratum list, and a running total made in the next column. One can then go down the column systematically with a constant sampling interval from a random start less than the interval, and take the schools where each interval ends. For selecting students within selected schools the Student Name Forms (IEA/SN1-4S) can be used. The school will have written down the names of the population in the left hand column, and a similar sampling procedure as outlined for schools can be used, the sampling interval being given by measure of size.

Alternatively, a procedure can be adoped whereby the sub-sampling is carried out by participating schools. Where this procedure is adopted the Student Name Form will have to contain the instructions in the top left hand corner requesting schools to enter the names of students who fall within the defined population and whose dates of birth fall within certain specified periods. Such periods will be determined by the sub-sampling fraction (f_2), e.g.- in a two ticket school instructions should be given for entering the names of students whose birth dates fall on the 1st - 15th (inclusive) of each month or, alternatively, on even or odd dates. In a three-ticket school students whose birth dates fall on the 1st - 10th (inclusive) should be entered or, alternatively, students born on the 1st, 4th, 7th, etc. of each month.

SECTION III

TRANSLATION

It is suggested that in the first place two translators be employed to translate the various materials. The translators should be persons who are specialists in the subject matter and also versed in item-writing. Should the two translators not agree, opinions of other translators should be sought. It is further suggested that a back-translation be made as a check. Where resources are limited, major effort should be put into the translation from English into the native language.

The following are the guide lines produced by the various International Subject Area Committees:

Science

To help in the translation of the Science tests, the following guide lines are given.

a) The tests are written in British English and therefore other English-speaking countries may find it necessary to adapt certain words or phrases to their own idiom (for example, petrol - gasoline, centimetre - centimeter, etc.)

b) Although flexibility in translation must exist, the general sense and difficulty of the item must be maintained.

c) Children's names are used in some items. Substitutes may be used if it is felt desirable.

d) When British units, e.g. pounds, miles etc, are used in the originals, the units should be changed (and the question suitably modified) to those in common use in the country concerned. Where scientific (CGS or MKS) units are used in the originals, these should be retained in the translation.

e) Names of plants, substances, etc. may be changed provided that the preservation of the original is not essential. For example, maize may be changed to corn and if moles are not fairly familiar animals, some similar soil burrowing mammals may be substituted.

Reading Comprehension and Reading Speed

In translation the objective is to produce an accurate translation that preserves so far as possible the difficulty level, in syntax and in vocabulary, of the original. Syntactic difficulty is probably closely related to sentence length and sentence complexity. Thus, so far as possible the number of sentences in translation of any passage should be kept the same as in the original, and the structure of parallel and subordinate clauses and phrases kept the same. In the Reading Speed translations every effort should be made to keep the number of words as close as possible to the original. Vocabulary is at best a matter of judgment. When the simplest English word for an idea has been used, the simplest equivalent should be used in translation, and when a relatively rare word has been used, it should be translated by a relatively rare word.

The following types of adaptation to national usage may be made:

(1) Names may be converted to familiar ones for the country - both names of persons and of places.

(2) Units of measure (and of currency) may be converted to the national ones - with any appropriate adjustment of quantities.

(3) Traffic directions (right and left) may be reversed for countries driving on the left.

Literature

1. The stories should be translated by a literary translator. This translation should then be checked by someone who is knowledgeable in the literature of both the country of origin of the story and of your own country.
2. The items should be translated after the story has been translated so that the item-translator may check his language against that of the stories. The items should then be back-translated (by a different translator) into English.
3. Before proceeding to printing, please send the following:
   (a) the story text in your own language,
   (b) the items in your own language,

(c) the back-translation of the items into English,

to: Dr. Alan Purves
Department of English
University of Illinois
Urbana, Illinois 61808
U.S.A.

4. Dr. Purves will then write to you either confirming that you should print your translations or suggesting possible modifications before printing.

Word Knowledge

No changes should be made from the pairs of words that were used in the pre-testing. If, for any reason, a National Center wishes to change the translation they should first write directly to Professor Thorndike about this

See also Page 1, Assumption 1

Questionnaires

Accompanying notes are provided with each questionnaire. However, it should be noted that in general greater freedom is permissible in the translation of all the questionnaires and in many instances, questions will have to be completely adapted for national use. It must be stressed, however, that where an international code has been provided, it is essential that the information is obtained nationally in such a way that the international coding can be applied. Where it is known that a given policy or practice is identical for one entire country, the question regarding that practice need not be asked. However, it is important that information about this item be properly coded at the National Center according to the international coding e.g., in Poland, all schools in the country are financed by the Central Government. Thus, it is not necessary to ask about finances in the school questionnaire. However, the information would have to be coded appropriately at the National Center. It is also important to note that if certain information is not variable throughout the country, it can be obtained at the National Center, or from a source other than the school, and be coded appropriately.

Attitude and Descriptive Scales

Accompanying notes are provided with each instrument. Where problems are encountered in translation, please write immediately to the Coordinator in Hamburg.

Manuals 2 and 3

These are straightforward to translate, but should you encounter problems, please write immediately to the Coordinator in Hamburg.

SECTION IV

PRINTING FOR DRY RUN

Cognitive Tests

As far as possible the cognitive tests for the dry run should be printed (typeset or photo-offset). It is very much hoped that no changes will be made in these tests before the final testing.

Special Note:

> Pop. IV Science Tests. For Test IVB (IEA/11B P-U) the last six items will need to be printed separately. There will be six different sets of these last six items. Thus, when these sets are attached to the common 24 items of IEA/11B, there will be six different versions of IEA/11B. The six different sets of six items will be lettered P - U. Printing must be arranged so that appropriate identification numbers and letters (i.e. IEA/11B P, IEA/11B U, etc.) appears clearly on the front cover of each different form of the whole test.

Attitude and Descriptive Scales

As far as possible these instruments should be duplicated or multi-lithographed, since it is quite possible that changes may be made before the full testing.

Questionnaires (ST, TCH, SCH)

As far as possible these instruments should be duplicated or multi-lithographed, since it is quite possible that changes may be made before the full testing.

Answer Cards

Answer Card will be supplied to each National Center requesting them.

Manuals 2 and 3

At this stage the requisite number of Manuals for the dry run need only be mimeographed.

SECTION V

ADMINISTRATIVE ARRANGEMENTS

1. It is assumed that (a) an appropriate number of schools have been drawn
   (b) agreement has been obtained, where necessary, to approach the schools drawn in the sample.

Contacting Schools

2. A letter signed by the Head of the National Center or some other appropriate high offical, including the following points is to be sent to the head teachers of those schools:
   (1) Giving the purpose of the project.
   (2) Asking the co-operation of school.
   (3) Indicating the approximate number of students from various grades (forms) to be tested in that school.
   (4) Giving the proposed dates of testing in that school.
   (5) Indicating the amount of time involved in testing.
   (6) Detailing the other demands to be made on the school (e.g. students to fill in questionnaires and attitude and descriptive scales, and for Teacher and School Questionnaires to be completed.)
   (7) Asking for the name of the person to be responsible for testing in that school (School Co-ordinator) or informing the Head Teacher of the arrangements you will be making from your National Center.
   (8) Requesting name of person to whom all future correspondence should be addressed.
3. As soon as co-operation has been obtained, a further letter covering the following points should then be sent to each school:
   (1) Thanking school for co-operation.
   (2) Enclosing copies of Manual 2.
   (3) Giving an explanation of how to complete Student Name Forms (IEA/SM -4S-x copies of which are enclosed see page 18). This may be an onerous task for large schools. National Centers must find the most appropriate way to induce the schools to co-operate. One such procedure is to have the schools do the sub-sampling by using date of birth (see page 6). Note: The Student Name Form at the end of this manual is included for

guidance only. It may be that a National Center would wish to send out a Students' Name Form that contains only the first 2 columns of the present Student Name Form. Upon return of this simplified return form, the National Center should paste it on the original Student Name Form.

(4) Giving an explanation of how to complete Teacher Name Forms (IEA/TN 1 - x copies of which are enclosed see page 21). Since the National Center will need to know which teachers are Science teachers and which are Mother Tongue teachers (or Reading Comprehension or Literature teachers, if in fact, National Centers wish to distinguish these teachers) it is suggested that the School Co-ordinator is asked to check in columns 2, 3 and 4 appropriately. If no separation is made between Reading Comprehension and Literature teachers for Populations II and IV, then these teachers should complete both Teacher Reading Comprehension and Literature questionnaires.

(5) Pointing out the necessity for keeping to the arrangements in Manuals 2 and 3.

4. Answer Cards

(1) These must be ordered from Hamburg on IEA/A/32 when the details of the sample are known. The normal procedure will be for the IEA Data Processing Staff to arrange for the punching of identification codes (Columns 3 - 12 of each card) before distribution to National Centers. Some National Centers may prefer to do this punching themselves, and they will be given complete and detailed instructions for doing this. The following notes apply, therefore, mainly to National Centers who want the cards to be pre-punched with identification codes before they receive them.

(2) The cards will arrive at the National Center in the following sequence:

(a) School Science card(s) for School 001
(b) Teacher Cards for School 001
(c) Cards for Student 001 of School 001
(d) Cards for Student 002 of School 001, etc.
(e) Blank separation card
(f) School Science Card(s) for School 002, etc.

N.B. The cards for Population I, II, III and IV will be shipped separately

(3) The cards will contain ten columns of pre-punched identification code. This is interpretable as follows:

Columns 3 - 4		Country code as previously distributed
Columns 5 - 7		School code 001 - 999
Column 8		Population code 1, 2, 3, 4
Columns 9 - 11		Student code 001 - 999 (000 for School card, -01 - -99 for Teacher cards)
Column 12		Document and Test code:
	1.	Science Card Population I
	2.	Reading Comprehension Card Population I
	3.	Science Tests Population II
	4.	Science Attitude and Questionnaire Population II, III & IV
	5.	General Questionnaire Populations II, III & IV
	6.	General Attitude Scales Populations II, III & IV
	7.	Reading Comprehension Populations II, III & IV
	9.	Science Specialist Test Card Population IV
	A,B,C.	School Questionnaire (punched card)
	D.	School "Opportunity to learn" Science
	J.	Punched Card Population I Questionnaire
	K.	Punched Card Population I Word Knowledge
	L.	Punched Card Population I General Attitude Scales.
	P,Q,R,S,T,U.	Answer Card 3 when used for Population IV Science Tests
	X,Y,Z.	Answer Card 8 used to specify form of Literature Test (Booklet 8)

(4) The Special School Science Card(s) will be used for marking the "Opportunity" to learn for each item in the Science Tests. The cards will be as follows:

Population I: Card 1 with document code D.
Population II: Card 3 with document code D.
Population III: Card 3 with document code D.
Population IV: Card 3 with document code D, and Card 9 with document code E. (See paragraph 7, page 16 for use of these cards)

(5) Each teacher will need one answer card only. It contains sections for each of the four questionnaires - General, Science, Reading Comprehension, and Literature, but teachers should fill in only those parts appropriate for the subject they teach. The part of the identification code used for the Student Number will be contained on the Teacher Card -01, -02, etc.

(6) For Populations II and IV in countries which are testing Literature, each student will be assigned Text X, Y, Z at random. The form assigned will be specified in the document code (Column 12) of Card No. 8, (the Literature Card) of each Student Number Card. When making up the Student Envelopes, National Centers will need to choose the appropriate form of Booklet 8. Thus, if the document code on Card 8, for a certain student is Y, then IEA/8Y is the Booklet that should be placed in his envelope.

(7) For Population IV, Science Test B comes in six forms, P - U. Which one should be given to any particular student can be determined from the document code (Column 12) of the appropriate answer card (Card 3) for that student, e.g. if the document code specifies form T, then Booklet IEA/11B T should be placed in the envelope.

Preparation for the Dispatch of Materials to Schools

5. When the Student Name Forms have been returned, the following action will have to be taken on each:
   - (a) Check the date of birth and eliminate all students who fall outside the determined target population.
   - (b) Carry out appropriate sub-sampling, where necessary, see pages 4 - 5.
   - (c) Enter consecutive numbers in Column 3 against the names of the students to be tested. Start with 001, 002, etc.
   - (d) Indicate on these Student Name Forms in the appropriate columns the particular materials to be given to each student to be tested. For Population IV students, an indication must be made in the appropriate column (4) which form (P - U) of IEA/11B is to be given to which student. This may be done by reference to Answer Card 3 as outlined in Section 4 , paragraph 7 above. Similarly, Column 8 should contain either X, Y, Z, depending upon which Literature test has been assigned.
6. Using the Student Name Forms the appropriate booklets for any one student can now be packaged into the Student Envelope.

The name of the student and his school should be clearly written on the front of the Student Envelope. Furthermore, the name and code number of the student and his school should be also clearly written on the front of the Student Envelope. All of the Student Envelopes for any one school are now packaged together with a duplicate copy of the relevant Student Name Form for that school and target population.

7. Using the Teacher Name Form, the appropriate Teacher Questionnaires together with the Teacher Return Envelope containing the answer card are packaged into the Teacher Envelope. Furthermore, the name of school should be clearly written on the front of the Teacher Return Envelope together with the appropriate code numbers. All of the Teacher Envelopes for any one school are now packaged together with a duplicate copy of the Teacher Name Form for that school.
8. Preparation of the School Questionnaire. Question 33 of the School Questionnaire request the School Co-ordinator to obtain ratings on the extent to which the Science test questions being given in the school have been included in the previous curriculum the student has taken. These ratings are to be entered on special Science answer cards described in paragraph 4, page 15. A copy of each answer card for Science tests being given should therefore be enclosed in a suitable return envelope and attached to copies of the Science tests. For Population IV, in addition to the regular Population IV tests, each school should be sent a complete copy of the IVS Specialist tests together with the appropriate answer card. (Card 9). These should be placed into a large strong envelope and addressed - The School Co-ordinator, SCH Q33.
9. The materials for any one school can now be made ready for dispatch. In addition, an extra packet containing about 10% additional testing material should be included for replacement purposes in case of loss or damage.
10. A copy of Manual 3 along with all the testing material to be used for each testing session should be sent to each School Co-ordinator so that he can become familiar with the actual testing procedures. He will have already received Manual 2. National Centers may feel, however, that it would be desirable to bring School Co-ordinators together (perhaps on a regional basis) some weeks before the actual testing, so that they may be fully instructed about the part they

have to play in the survey. Their briefing should include the following points:

(a) Purpose of survey

(b) Explanation of all survey documents (tests, questionnaires, attitude scales and descriptive measures, answer cards, envelopes (students' and teachers'), manuals, etc.)

(c) Instructions for briefing of test supervisors

(d) Organization of testing sessions

(e) Arrangements for completion of Teacher and School Questionnaires

(f) Arrangements for holding meetings of teachers to obtain ratings of students "Opportunity" to learn

(g) Procedures for dealing with administrative errors which occur (e.g. the wrong tests being given to a particular child)

(h) Procedures for checking student answer cards

(i) Procedures for returning materials

11. At the appropriate time before the country's date for testing the packages containing all the materials for testing can be sent to the School Co-ordinators. At the same time a letter should be sent to each School Coordinator asking him to check that the right materials are received. Note: Descriptions of the contents of the envelopes should be given.

Population I

To School Coordinator:
Please list below, in any convenient order, all students together with their dates of birth in your school who will be aged 10 but not 11 on ________

I.E.A.

Student Name Form

(SN1)

Code No.

Population I

School

Name of School ________

Address ________

STUDENT			Science Booklet 1 (4)	General Questionnaire Booklet 2 IEA/2G (5)	Reading Comprehension Booklet 3 (6)	Answer Card 1 (7)	Answer Card 2 (8)	Student Return Forms (9)
Name (1)	Date of Birth (2)	Code Number (3)						

Population II

To School Coordinator:
Please list below, in any convenient form, all students together with their dates of birth in your school who will be aged 14 but not 15 on ________

I.E.A.

Student Name Form

(SN2)

Code No.
Population ________II________
School

Name of School ____________________
Address ____________________

S T U D E N T			Science		General Questio -nnaire Booklet 6 (6)	Reading Compre -hen -sion Booklet 7 (7)	Literature		A n s w e r C a r d s						Stud.
Name (1)	Date of Birth (2)	Code Number (3)	Booklet 4 (4)	Booklet 5 (5)			Booklet 8 (8)	Booklet 9 (9)	3 (10)	4 (11)	5 (12)	6 (13)	7 (14)	8 (15)	Envel-ope. (16)

Population IV

To School Coordinator:
Please list below, in any
convenient form, all students
in school who are currently in
the pre-university year grade

I.E.A.

Student Name Form

(SN4)

Code No.
Population School IV

Name of school ______________________
Address ______________________

S T U D E N T		Science			General Question-naire	Reading Compre-hen-sion	Literature		Answer Cards						Stud.
Name (1)	Code Number (2)	Booklet 10 (3)	Booklet 11 (4)	Booklet 12 (5)	Booklet 13 (6)	Booklet 14 (7)	Booklet 8 (8)	Booklet 9 (9)	3 (10)	4 (11)	5 (12)	6 (13)	7 (14)	8 (15)	Envel-ope. (16)

Population I
To School Coordinator:
Please list below, in any convenient order, all teachers in your school who are teaching one or more of the subjects being tested and check in Columns 2, 3 and 4 the subject which they are teaching.

I.E.A.
Teacher Name Form
(TN1)

Code No.
Population ____________
School ____________
Name of School ____________
Address ____________

Name of Teacher (1)	Science Quest. (2)	Read. Comp. Quest. (3)	Lit. Quest. (4)	General Quest. (5)	Answer Card 10/11 (6)	Teacher Return Envelope (7)

SECTION VI

TIMETABLE OF TESTING PROGRAM

The estimated times for the testing programs for Populations I, II and IV are given in the following pages. They do not include time for distribution of materials and giving of directions. The testing materials have been assembled into a series of booklets, and the testing organized into a series of sessions. These details have been given in the following tables which also give the new IEA numbers for section of booklets and also the numbers for answer cards. These answer card numbers and the section letters will be prominently displayed on the answer card. It is important that the sequence of the sessions be adhered to.

POPULATION I

Booklet No.	Instrument	IEA No	Card No.	Time	Sessions
1	Science I - Section A	IEA/1A	1	30 min.	1
	Science I - Section B	IEA/1B		30 min.	
	Science Attitude and Descriptive - Section K	IEA/1K		15 min.	
2	Word Knowledge Test Section F	IEA/2F	Punched	10 min.	2
	General Questionnaire Section G	IEA/2G		15 min.	
	General Attitude Descriptive - Section H	IEA/2H		10 min.	
3	Reading Comprehension Section C	IEA/3C	2	25 min.	3
	Reading Comprehension Section D	IEA/3D		25 min.	
	Reading Speed (Practice) Section P	IEA/3P		10 min.	
3J	Reading Speed (Test) Section J	IEA/3J	IEA/3J to be returned to National Center		

POPULATION II

Booklet No.	Instrument	IEA No.	Card No.	Time	Sessions
4	Science II - Section A	IEA/4A	3	60 min.	1
	Science II - Section B	IEA/4B		60 min.	2
5	Science Questionnaire Section S	IEA/5S	4	15 min.	3
	TOUS - Section T	IEA/5T		20 min.	
	Science Attitude and Descriptive - Section K	IEA/5K		15 min.	
6	Word Knowledge Section F	IEA/6F	5	10 min.	4
	General Questionnaire Section G	IEA/6G	1 sheet to be returned to National Center	15 min.	
	General Attitude and Descriptive - Section H	IEA/6H	6	15 min.	
7	Reading Comprehension Section C	IEA/7C	7	50 min.	5
	Reading Comprehension Section D	IEA/7D		50 min.	6
	Reading Comprehension Questionnaire- Section E	IEA/7E		15 min.	7
	Reading Speed (Practice) Section P	IEA/7P		10 min.	
7J	Reading Speed (Test) Section J	IEA/7J	IEA/7J to be returned to National Center		
8	Literature II Section X, Y & Z	IEA/8 X,Y,Z	8	50 min.	8
9	Literature II Section W	IEA/9W		50 min.	9
	Literature Questionnaire Section Q	IEA/9Q		15 min.	10
	Literature Attitude Section R	IEA/9R		15 min.	

POPULATION IV

Booklet No.	Instrument	IEA No.	Card No.	Time	Sessions
10	Science IV - Section A	IEA/10A	3	60 min.	1
11	Science IV - Section B	IEA/11B P - U		60 min.	2
12	Science Questionnaire Section S	IEA/12S (Same as IEA/5S)	4	15 min.	3
	TOUS - Section T	IEA/12T		20 min.	
	Science Attitude and Descriptive - Section K	IEA/12K (Same as IEA/5K)		15 min.	
13	Word Knowledge Section F	IEA/13F	5	10 min.	4
	General Questionnaire Section G	IEA/13G (Same as IEA/6G		15 min.	
	General Attitude and Descriptive - Section H	IEA/13H (Same as IEA/6H	6	15 min.	
14	Reading Comprehension IV Section C	IEA/14C	7	50 min.	5
	Reading Comprehension IV Section D	IEA/14D		50 min.	6
	Reading Comprehension Questionnaire- Section E	IEA/14E same as 7E		15 min.	7
8	Literature Section X-Y-Z	IEA/8 XYZ	8	50 min.	8
9	Literature - Section W	IEA/9W		50 min.	9
	Literature Questionnaire Section Q	IEA/9Q		15 min.	10
	Literature Attitude Section R	IEA/9R		15 min.	

NATIONAL OPTIONS IVS

Booklet No.	Instrument	IEA No.	Card No.	Time
15	Biology - Bio	IEA/15	9	60 min.
16	Chemistry - Che	IEA/16		60 min.
17	Physics - Phy	IEA/17		60 min.
18	Literature - open-ended (Hemingway)	IEA/18		60 min.

SCIENCE PRACTICALS

19	Science Practical II	IEA/19		90 min.
20	Science Practical IV	IEA/20		90 min.
21	Science Practical IV Biology	IEA/21		90 min.
22	Science Practical IV Chemistry	IEA/22		90 min.
23	Science Practical IV Physics	IEA/23		90 min.

The testing times for Population III will be the same as those for Populations II and IV. National Centers testing Population IVS will require 1 additional hour of testing each for students taking Biology, Physics, Chemistry and Literature. National Centers giving the Practical Science Tests must arrange separate sessions for these.

Sequence of Testing

The sequence in which tests, questionnaires etc. are administered should correspond to the order in which the sessions are listed in the previous tables. It is suggested, for example for Population II, that the two Science tests (sessions 1 and 2) can be administered in the morning, possibly with a 15 minute break between sessions. Sessions 3 and 4 can be administered in the afternoon, possibly with a short break between sessions.

For countries also taking Reading Comprehension and for countries taking Reading Comprehension and Literature, it is suggested that the testing sessions for these separate subjects be held on different days. National Centers should put the timetables they arrive at for their national testing into their Manual 2 for School Coordinators.

Special Note: National Centers taking up the option of testing Population IVS may encounter the following situations:

Science:

(1) Some students will only be taking one of the IVS tests (i.e., Biology or Chemistry or Physics); other students, however, will be taking two or even three of these specialist tests.

(2) If sub-sampling in Population IV has occurred, it is possible that there will be some students to be included in the IVS sample who will not have been in Population IV sample, and hence will not have taken either the Science or the General Student Questionnaire.

To overcome these problems the following solutions are suggested:

1. Administration. It is suggested that all IVS Science students are seated together for the first testing session, taking whichever test is appropriate for them (i.e. Biology, Chemistry or Physics). For the second hour of testing only those students taking a second test remain, the others having been let out of the testing room. Similarly for the third hour, if necessary.

It is further suggested that subsequently all those students who have not completed a General and a Science Student Questionnaire (while in Population IV sample) be recalled to complete these.

2. Data Processing. To cope with the problem of linkage between a student's responses on the IV answer card and the IVS answer card, it is suggested that the latter are also returned to the IEA computation center. A master file will then be compiled which will include both the IV and the IVS data. For the normal international processing a working file will be produced for Population IV only. National Centers may, on request, obtain a copy of the complete master file IV, the working file for IV and for the raw data for IVS. Note: It is envisaged that some analysis for Population IVS Tests can be done at the International Computational Center.

SECTION VII

RETURNING DATA TO PROCESSING CENTER

On Receipt of Materials from Schools

1. All materials returned from schools must be carefully checked and steps taken to retrieve mislaid or not returned material.
2. The materials from schools requiring further action are:
   (i) Student Envelopes (together with Student Name Form)
   (ii) Teacher Return Envelopes (together with Teacher Name Form)
   (iii) School Questionnaire.

   The remaining materials (test booklets, questionnaires, etc.) may be disposed of as each National Center desires.

National Centers not using answer cards at all must make their own arrangements for the punching responses to all materials.

Student Envelopes

Care should be taken in opening the envelopes that the answer cards are not damaged in any way.

3. Where answer cards have been used these must be checked on return from schools to ensure that all responses are sufficiently blackened and that all stray marks are removed. Torn or bent cards must be recopied and the full identification number written clearly in the appropriate box on the front of the card. No attempt should be made to punch the identification. All new cards that do not have their identification columns punched should be placed in a separate envelope, clearly marked for returning to the Data Processing Center.

Open-ended Questions

4. The open-ended questions on ST 2 (e.g. Student age, Father's occupation, etc.) must now be coded and the responses indicated in the appropriate spaces on the Student Answer Card 5. Coding and punching must also be carried out for ST 1 and the School Questionnaire.

Reading Speed Tests

5. The Reading Speed Tests (IEA/3J and IEA/7J) must be scored. There are two scores. The first is the number of errors in the first nine questions (i.e. on the first page of the reading and the second is the last item completed by the student. These two scores should be entered onto the bottom of the

back of Answer Cards. RS1 is the first score and RS2 is the first digit of the second score. RS3 is the last digit of the second score.

Teacher Return Envelopes

6. The Teacher Answer Cards should be extracted from their Return Envelopes and checked that the responses are sufficiently blackened. All stray marks, etc. should be removed. If necessary, e.g. with bent or torn cards, replacements should be made and the Teacher Identification number written in the appropriate box on the front of the new card. The cards should now be prepared for returning.

School Questionnaire

7. As there is no answer card for the School Questionnaire, this questionnaire must first of all be coded, and then punched and prepared for returning. The School Science Card should be checked for stray marks, etc. and prepared for returning.

Return of Data to IEA International Data Processing Center.

8.A. Answer Cards

Countries using MRC answer cards should take the opportunity provided by the hand checking of them to sort them into different piles according to type of card. Once this is done the cards should be sent in two separate packages to Hamburg. The reason for sending it in two packages is that it is not possible to make a duplicate set of cards, and should one shipment be lost, we are anxious not to lose the whole country's contribution to the study. It would be desirable if the separation were done by school; that is to say, if half the schools together form one package, and the other half the second.

B. Punched Cards or Magnetic Tape

Shipments of these should be made one population at a time. Before any data are sent a duplicate copy either of cards or magnetic tape should be made in case of accidents. All MRC cards from students and teachers and the School Science cards should be returned to:

Dr. T. N. Postlethwaite,
I.E.A.,
^{c}/o Unesco Institute for Education,
2000 Hamburg 13,
Feldbrunnenstr. 70.

All punched cards (or magnetic tape) should be returned to:

Dr. Bruce Choppin,
Teachers College,
Columbia University,
New York. N.Y. 10027,
U.S.A.

C. When the data are shipped to Hamburg or New York a letter should be sent stating

(i) what has been shipped,
(ii) when it was shipped and when it is estimated to arrive,
(iii) whether more data for the same population can be expected at a later date, and if so, when.

National Options

9. These are of three kinds:

(a) Extra Questionnaire Items added by National Center and of purely local interest.

Space has been allowed on the various MRC answer cards to allow for the recording of responses to extra questionnaire items. There are about 50 such spaces for each population grouped in sections X.1, X.2, X.3 for Population I and V.1, V.2, V.3 for the other populations. National Centers must make their own arrangements for collecting these data and should inform Hamburg of the details of the coding. These data will be read by the computer and stored. They will be analysed, however, but will be returned to the National Center at the conclusion of the international analyses.

(b) Optional Tests prepared by IEA, such as Science IVS, Literature IVS

IEA will help provide facilities for collecting these data in a standardised way. These materials will be subject to some international analyses although they are intended primarily for use by National Centers. They will, of course, be available to National Centers at the conclusion of the exercise.

(c) National Option Tests proposed by a Country for its own use.

These may be added to the battery without limit provided they do not jeopardize the proper working of the international part of the study. A special answer card (Card 10) has been prepared for use in these circumstances. The data will be read and stored. They will be analysed and finally returned to the National Center at the conclusion of the international analyses.

APPENDIX 1

TO MANUAL 1

List of Documents With Their Identification Number

LIST OF IEA DOCUMENT NUMBERS

Appendix 1 to Manual 1

Number	Name of Document
IEA/M1	Manual 1
IEA/M2	Manual 2
IEA/M3	Manual 3
IEA/SN1	Population I Student Name Form
IEA/SN2	Population II Student Name Form
IEA/SN3	Population III Student Name Form
IEA/SN4	Population IV Student Name Form
IEA/SN4S	Population IVS Student Name Form
IEA/TN1	All Populations Teacher Name Form
IEA/1A	Science Test IA
IEA/1B	Science Test IB
IEA/4A	Science Test IIA
IEA/4B	Science Test IIB
IEA/10A	Science Test IVA
IEA/11B P - U	Science Test IVB
IEA/15 Bio	Population IVS Biology - National Option
IEA/16 Chem	Population IVS Chemistry - National Option
IEA/17 Phy	Population IVS Physics - National Option
IEA/19	Science Practical II - National Option
IEA/20	Science Practical IV - National Option
IEA/21	Science Practical Biology - National Option
IEA/22	Science Practical Chemistry - National Option
IEA/23	Science Practical Physics - National Option
IEA/1 I	Science Attitude and Descriptive Scales - Population I
IEA/5K & 12K	Science Attitude and Descriptive Scales - Population II & IV
IEA/5S & 12S	Science Questionnaire
IEA/5T	Population II Test on Understanding the Nature of Science (TOUS)
IEA/12T	Population IV Test on Understanding the Nature of Science (TOUS)
IEA/3C	Reading Comprehension I A
IEA/3D	Reading Comprehension I B
IEA/3J	Population I Reading Speed
IEA/3P	Population I Reading Speed (Practice)
IEA/7C	Reading Comprehension II A
IEA/7D	Reading Comprehension II B
IEA/7E & 14E	Reading Comprehension Questionnaire - Populations II & IV
IEA/7J	Population II Reading Speed Test

Number	Name of Document	
IEA/7P	Population II Reading Speed (Practice)	
IEA/14C	Reading Comprehension IV A	
IEA/14D	Reading Comprehension IV B	
IEA/8X Y Z	Literature II Section X Y Z	
IEA/9W	Literature II	
IEA/9Q	Literature Questionnaire	Both Populations II & IV
IEA/9R	Literature Attitudes	
IEA/18	Population IV Literature open-ended - National Option	
IEA/2F	Population I Word Knowledge Test	
IEA/6F	Population II Word Knowledge Test	
IEA/13F	Population IV Word Knowledge Test	
IEA/2G	Population I General Questionnaire	
IEA/6G & 13G	Populations II & IV General Questionnaire	
IEA/2H	Population I General Attitudes and Descriptive Scales	
IEA/6H & 13H	Populations II & IV General Attitudes and Descriptive Scales	
IEA/SE1	Large Student Envelope	
IEA/SR1	Small Student Envelope	
IEA/TE1	Teacher Envelope	
IEA/TR1	Teacher Return Envelope	
IEA/TQ1	Teacher Questionnaire (General)	
IEA/TQ2	Teacher Questionnaire (Science)	
IEA/TQ3	Teacher Questionnaire (Reading Comprehension)	
IEA/TQ4	Teacher Questionnaire (Literature)	
IEA/SQ1	School Questionnaire	
IEA/NQ1	National Case Study Questionnaire	
IEA.1501.1	Answer Card for Population I Science	
IEA.1501.2	Answer Card for Population I Reading Comprehension	
IEA.1501.3	Answer Card for Science Tests , Populations II, III & IV	
IEA.1501.4	Answer Card for Science Attitudes Populations II, III & IV	
IEA.1501.5	Answer Card for General Questionnaire Populations II, III & IV	
IEA.1501.6	Answer Card for General Attitudes Populations II, III & IV	
IEA.1501.7	Answer Card for Reading Comprehension Populations II, III & IV	
IEA.1501.8	Answer Card for Literature Populations II, III & IV	
IEA.1501.9	Answer Card for Specialist Science Tests Population IVS	
IEA.1501.10	National Option Answer Card	
IEA.1501.11	Answer Card for Teachers	

APPENDIX 2

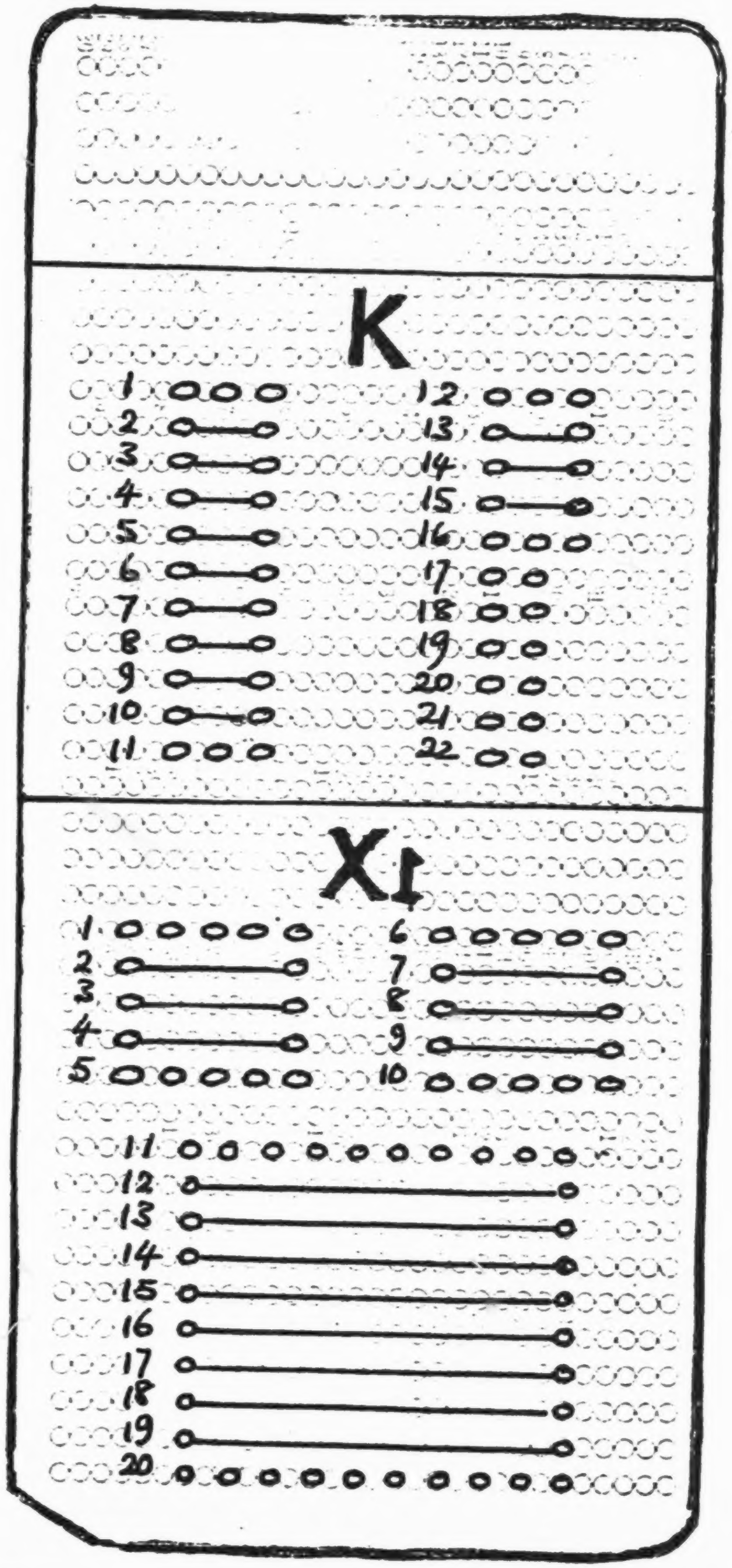
TO MANUAL 1

MRC Answer Card Format

Attached are the designs of the eleven answer cards to be used during the dry run. Examples of the actual cards to be used will be sent to National Centers as soon as we get them from the printers (about six weeks).

MRC ANSWER CARDS

Card Number	Front of Card	Back of Card
Card 1 Science Population I	Section L : practice items Sections A and B : cognitive tests A and B	Section K : attitude and descriptive measures Section X1 : national option space
Card 2 Reading Comprehension Population I	Sections C and D : cognitive tests C and D	Sections X2 and X3 : national option space
Card 3 Science Populations II,(III),IV	Section L : practice items Section A : cognitive test A	Section B : cognitive test B
Card 4 Science Populations II,(III),IV	Section S : questionnaire Section T : TOUS tests	Section K : attitude and descriptive measures
Card 5 General Populations II,(III),IV	Section F : Word Knowledge	Section G : general questionnaire Section O : post-coded section of general questionnaire
Card 6 General Populations II,(III),IV	Section H : general attitude and descriptive measures	Section V1 : national option space
Card 7 Reading Comprehension Populations II,(III),IV	Sections C and D : cognitive tests C and D	Section E : questionnaire Section V2 : national option space
Card 8 Literature Populations II,(III),IV	Sections X-Y-Z and W : cognitive tests	Section Q : questionnaire Section R : attitude and descriptive measures
Card 9 IVS Science	BIO : IVS Biology test CHE : first half of IVS Chemistry test	CHE : second half of IVS Chemistry test PHY : IVS Physics test
Card 10 National options	Sections I and II : national option space	Sections III and IV : national option space
Card 11 Teacher questionnaire	Section AA : General Section BB : Science	Section CC : Reading Comprehension Section DD : Literature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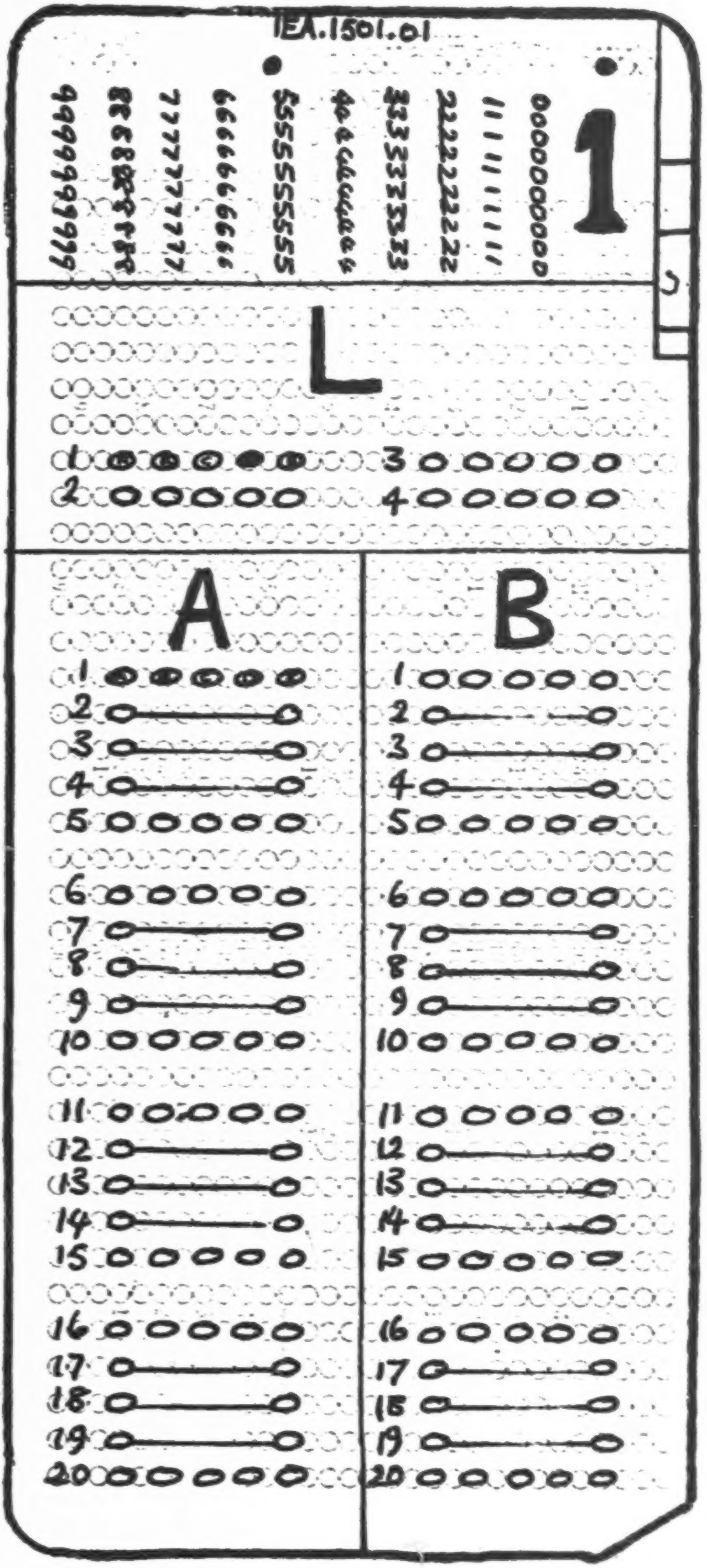
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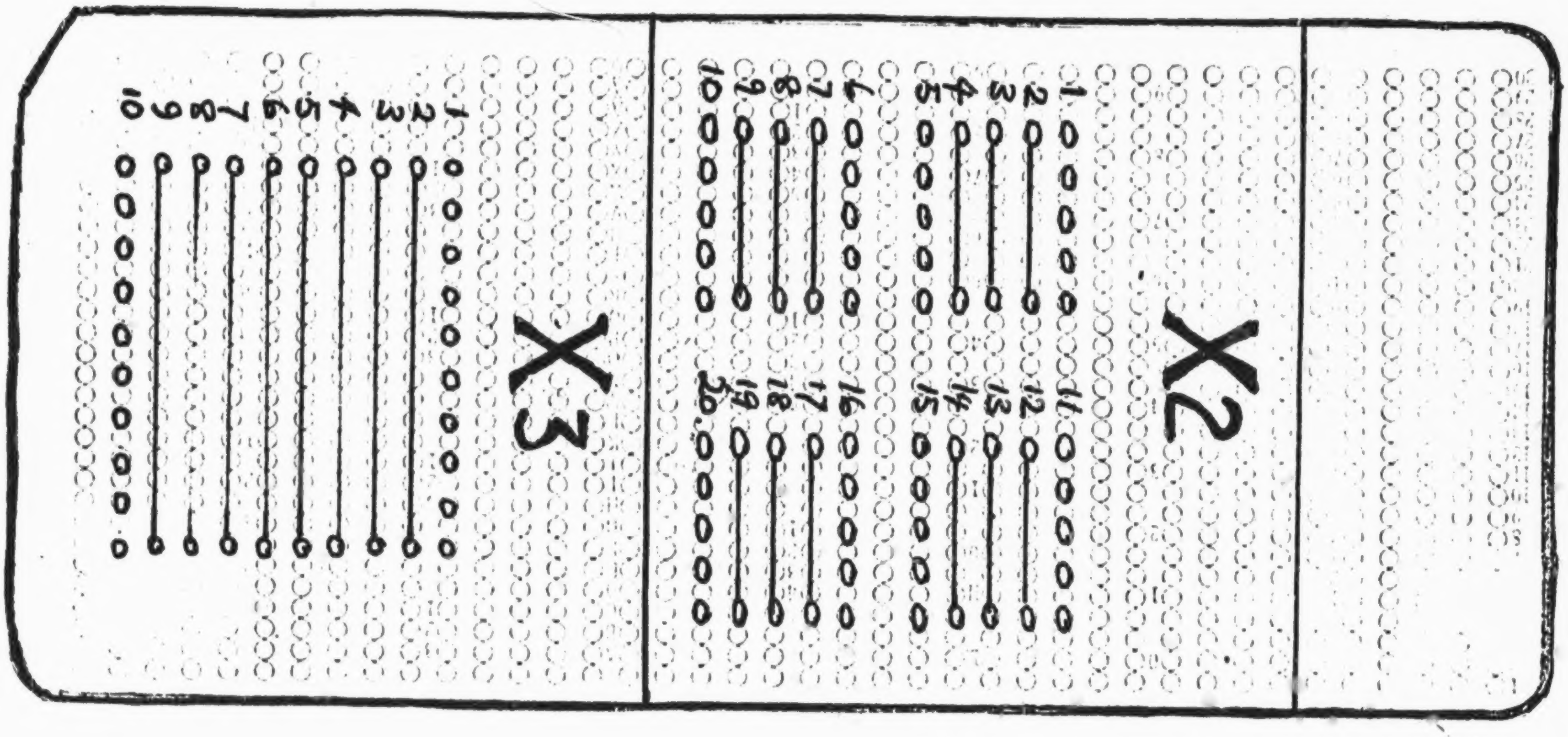
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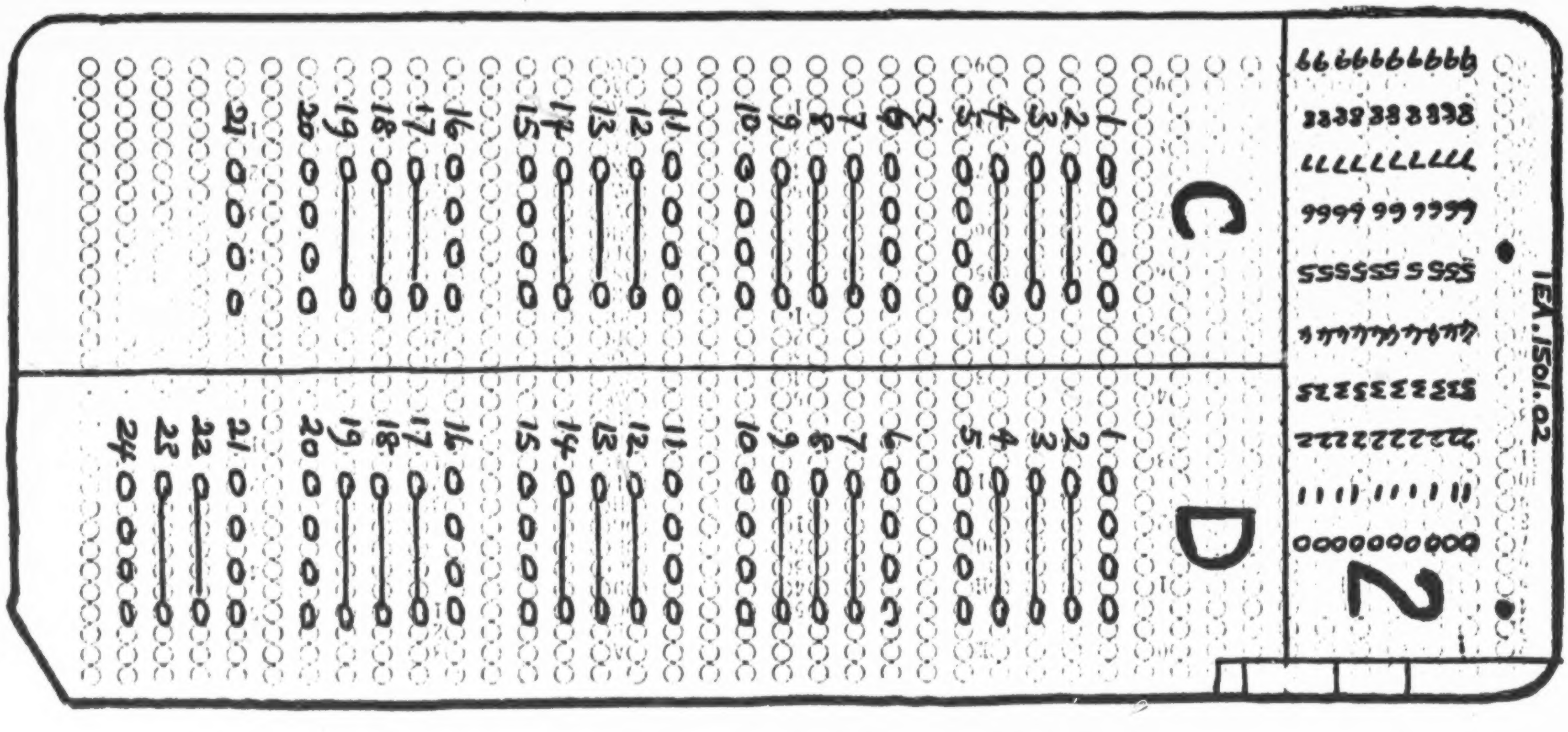
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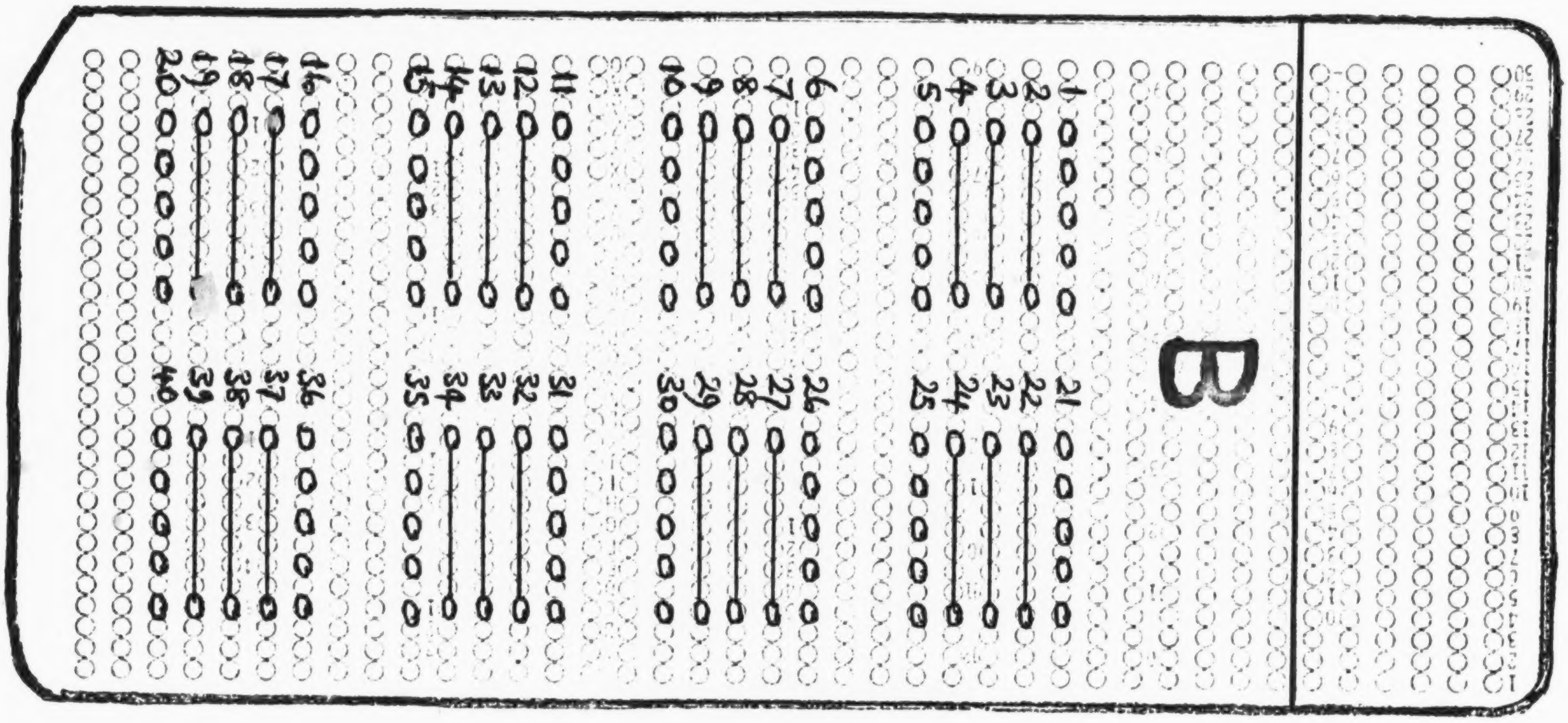
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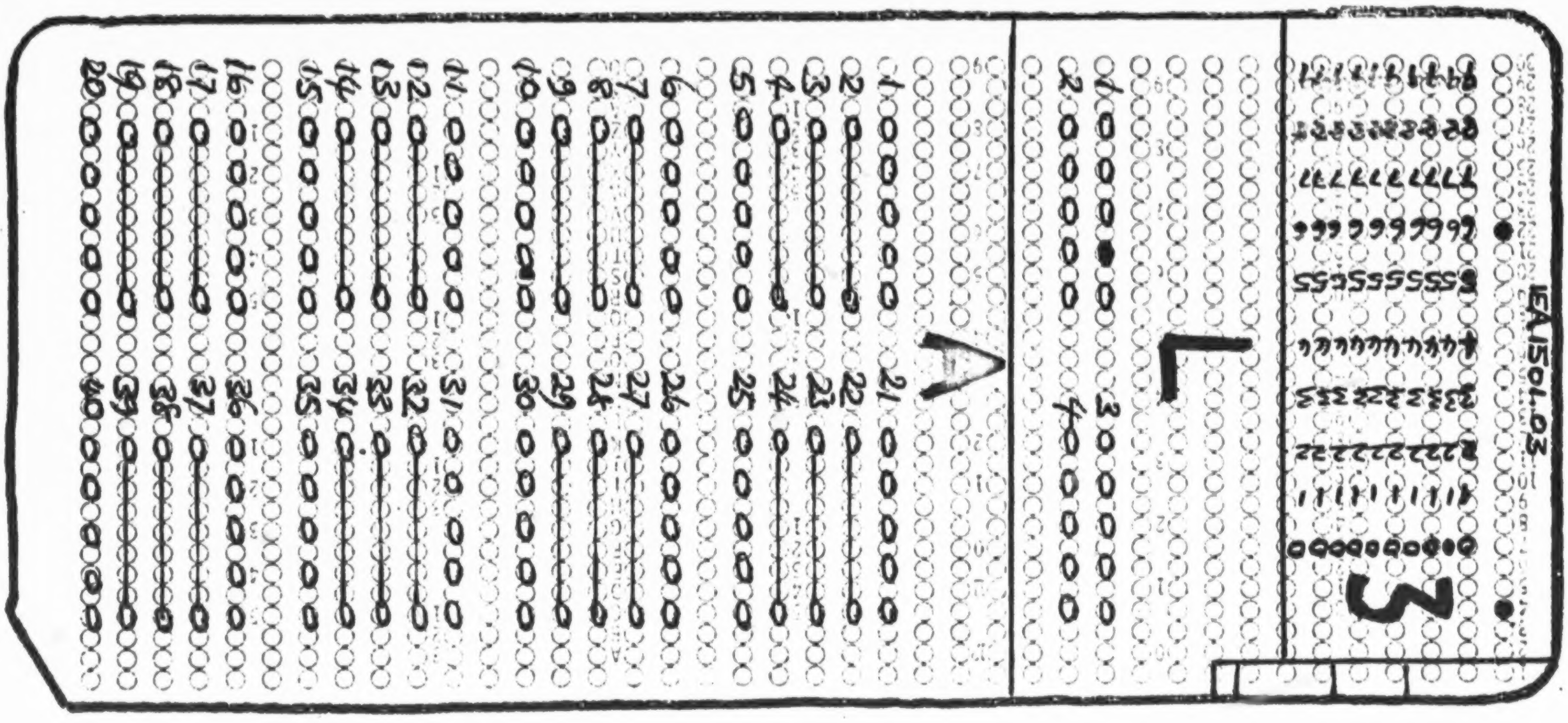
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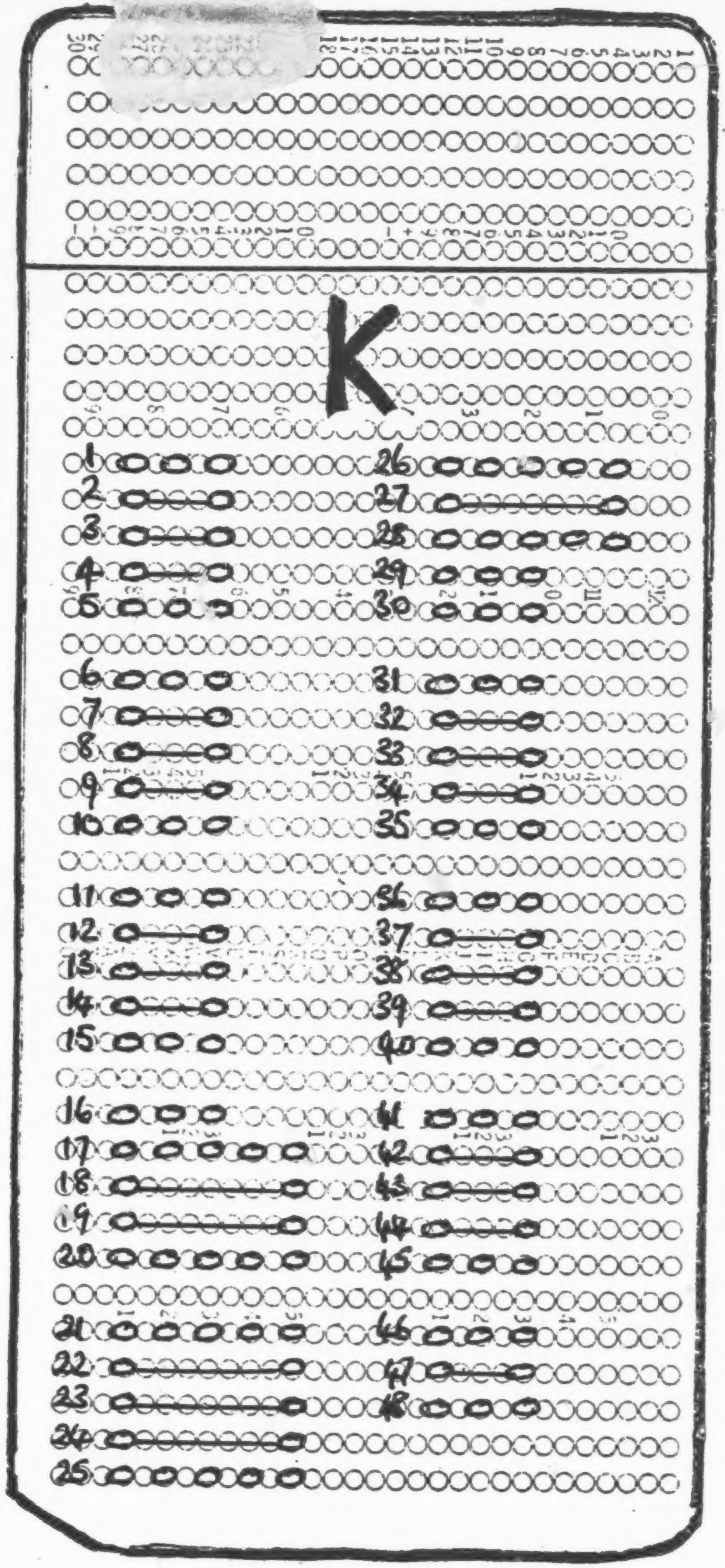
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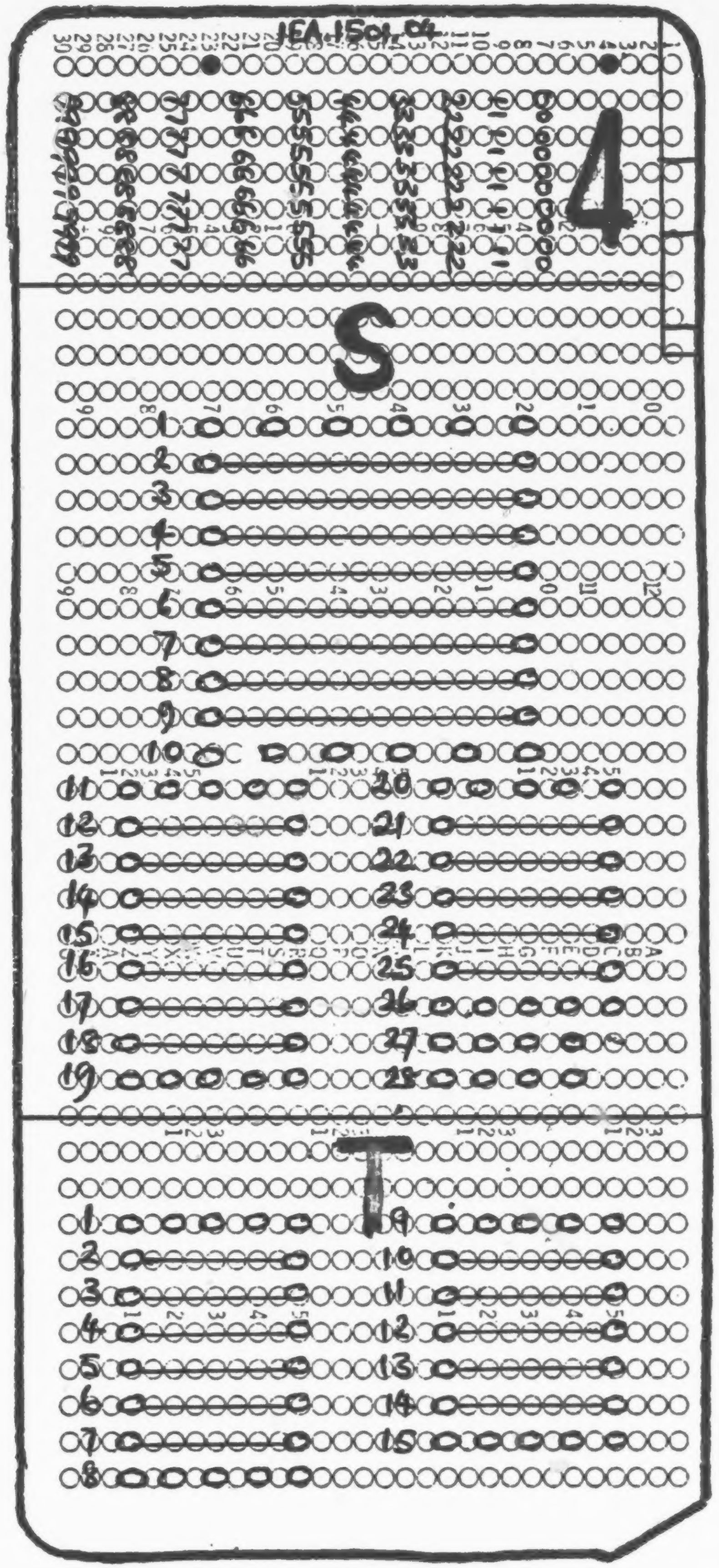
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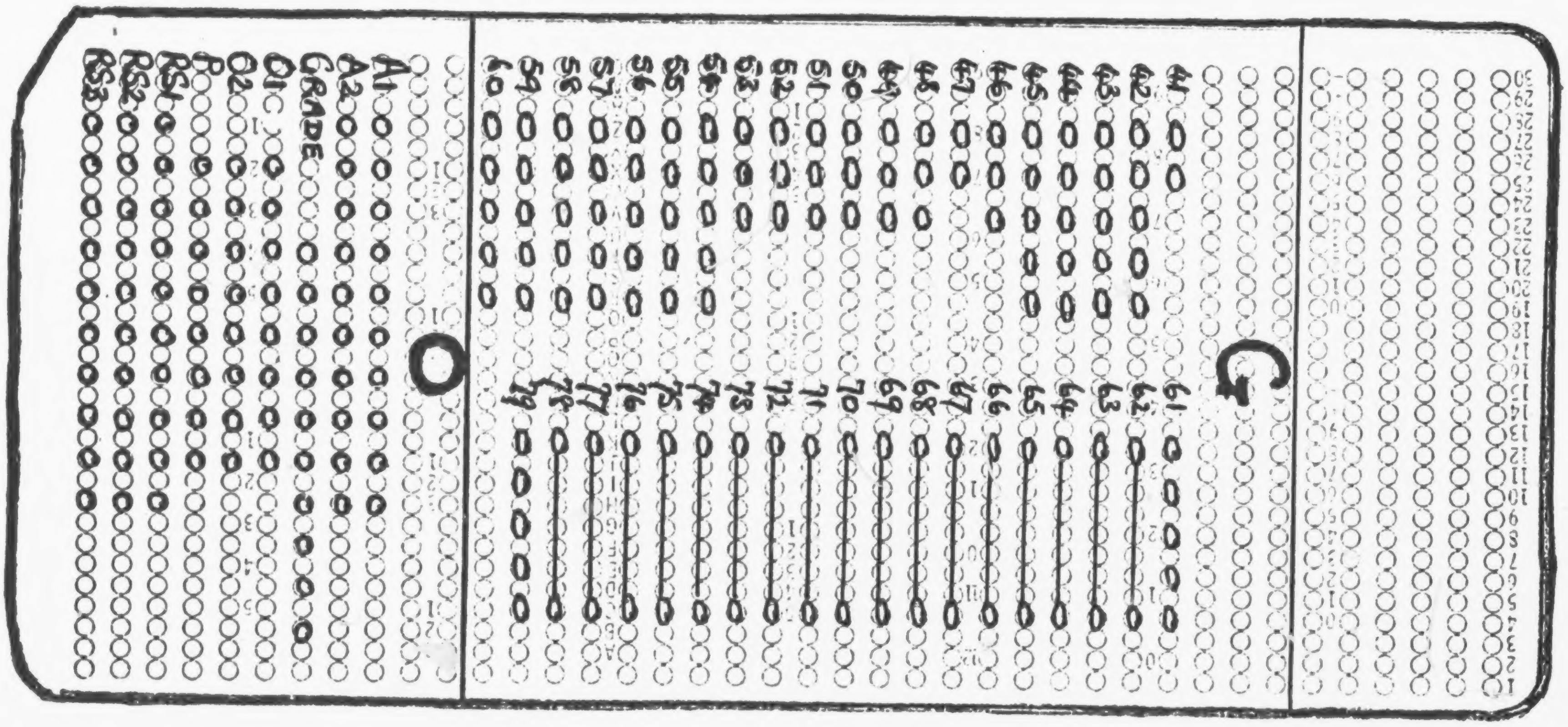
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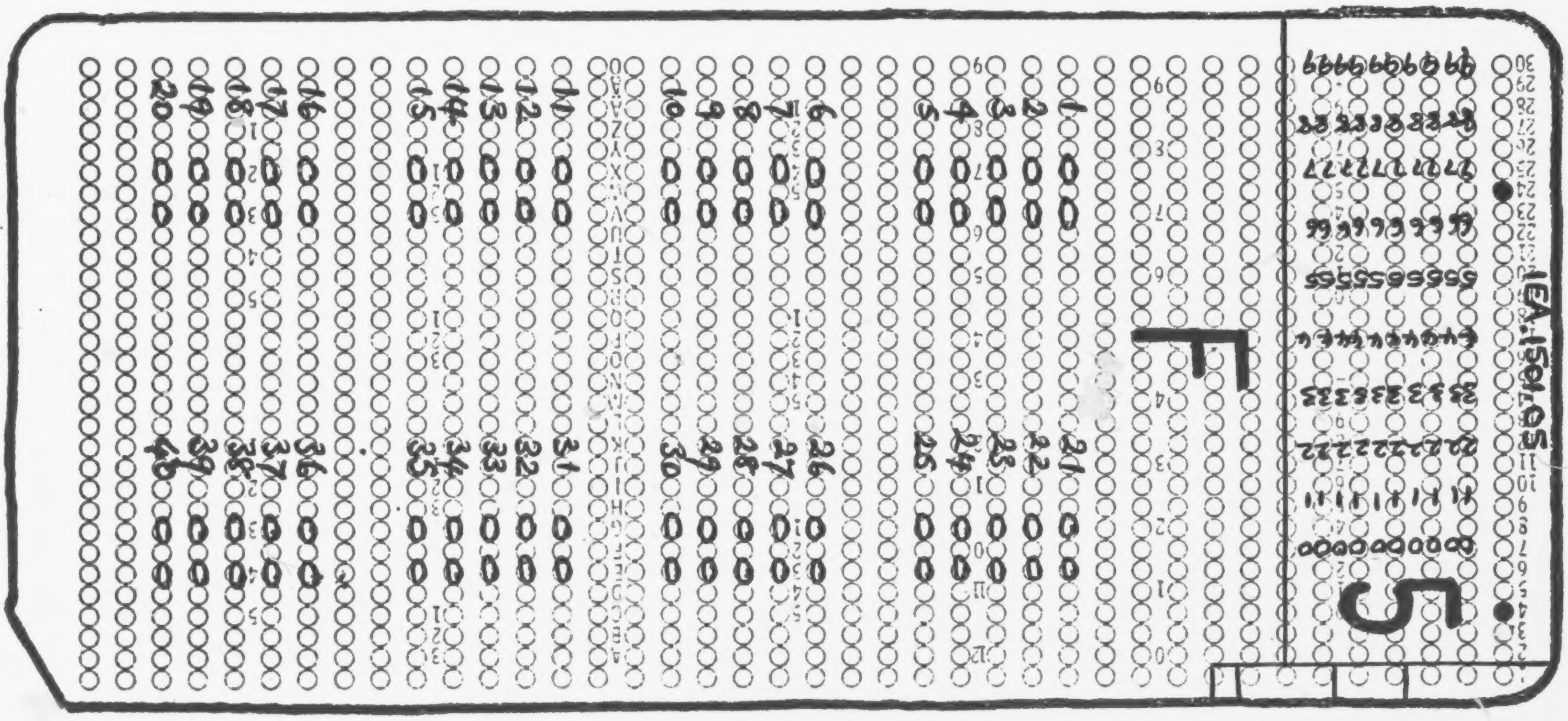
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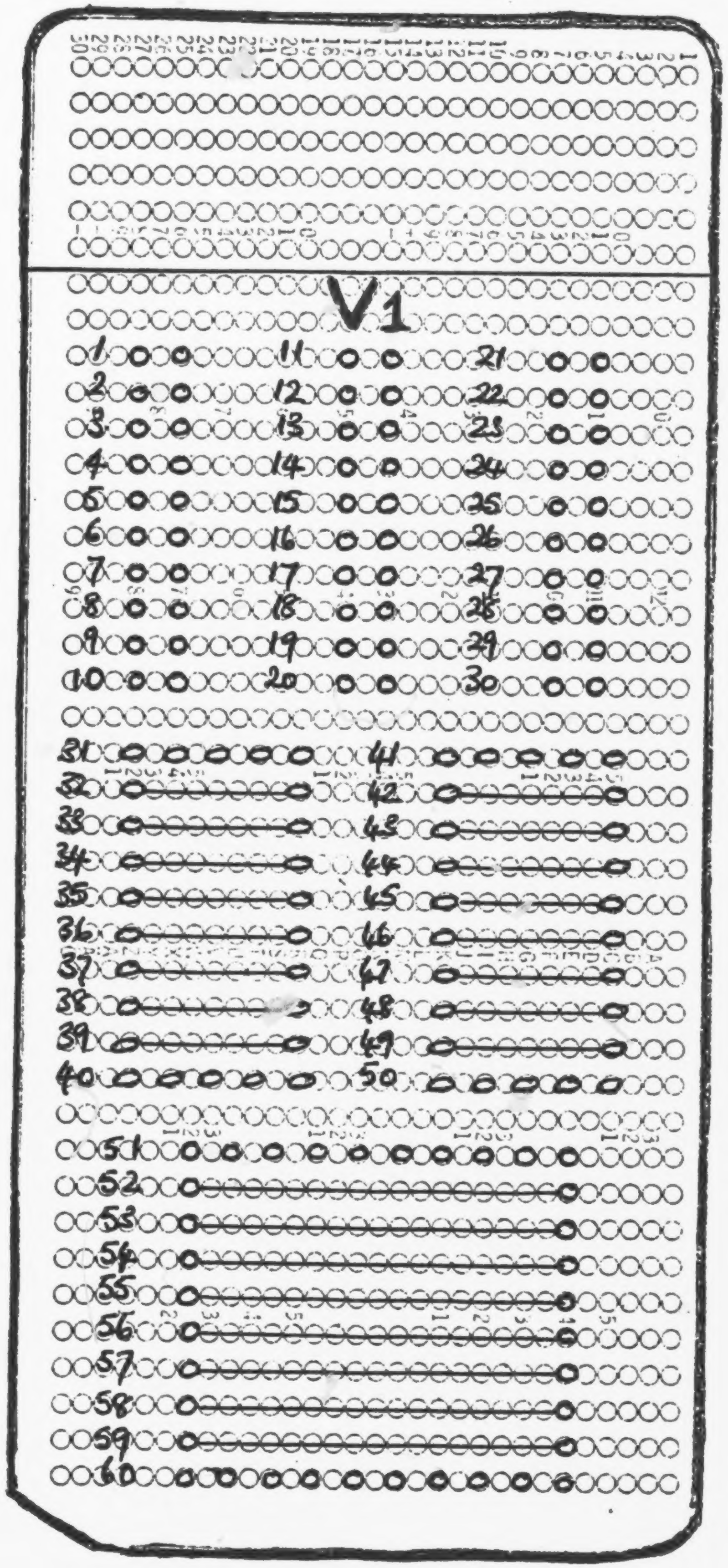
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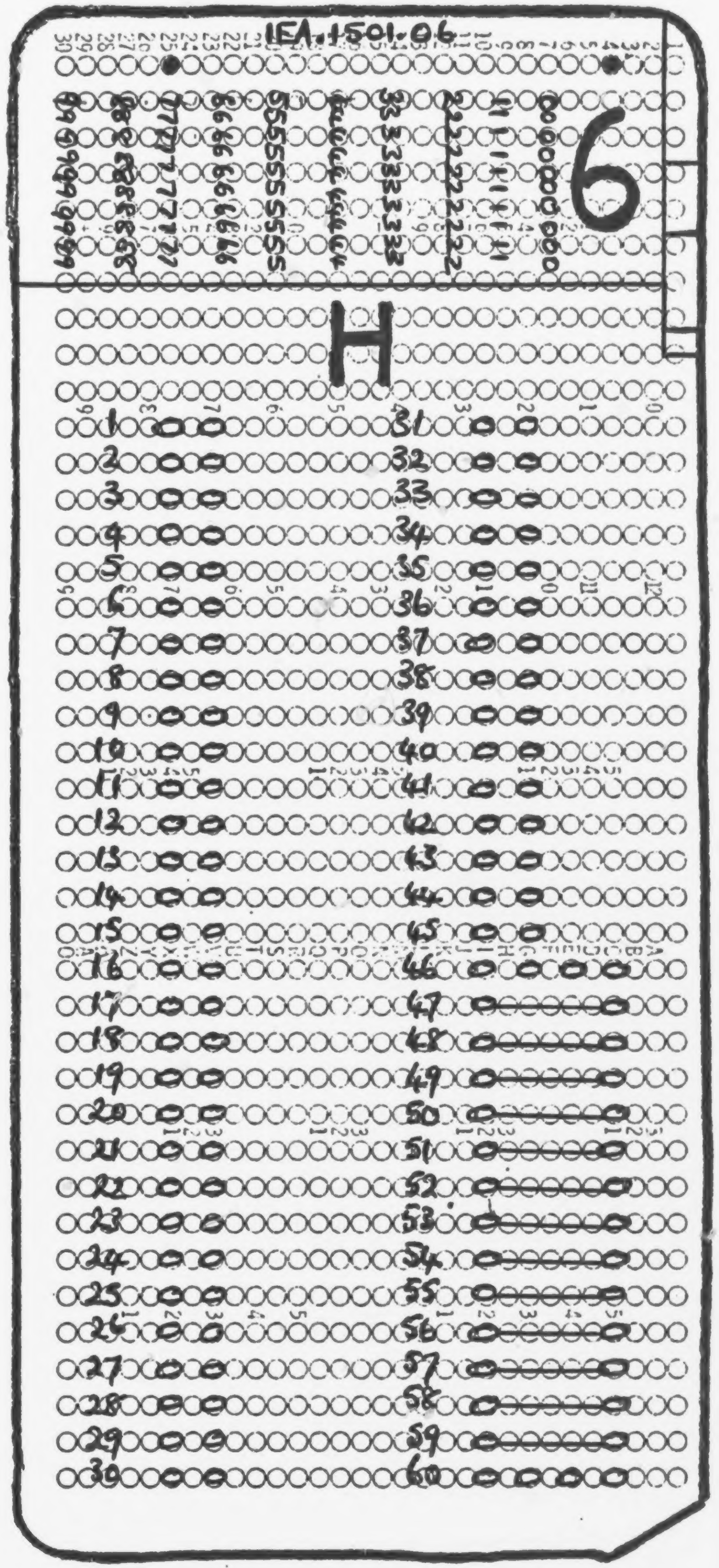
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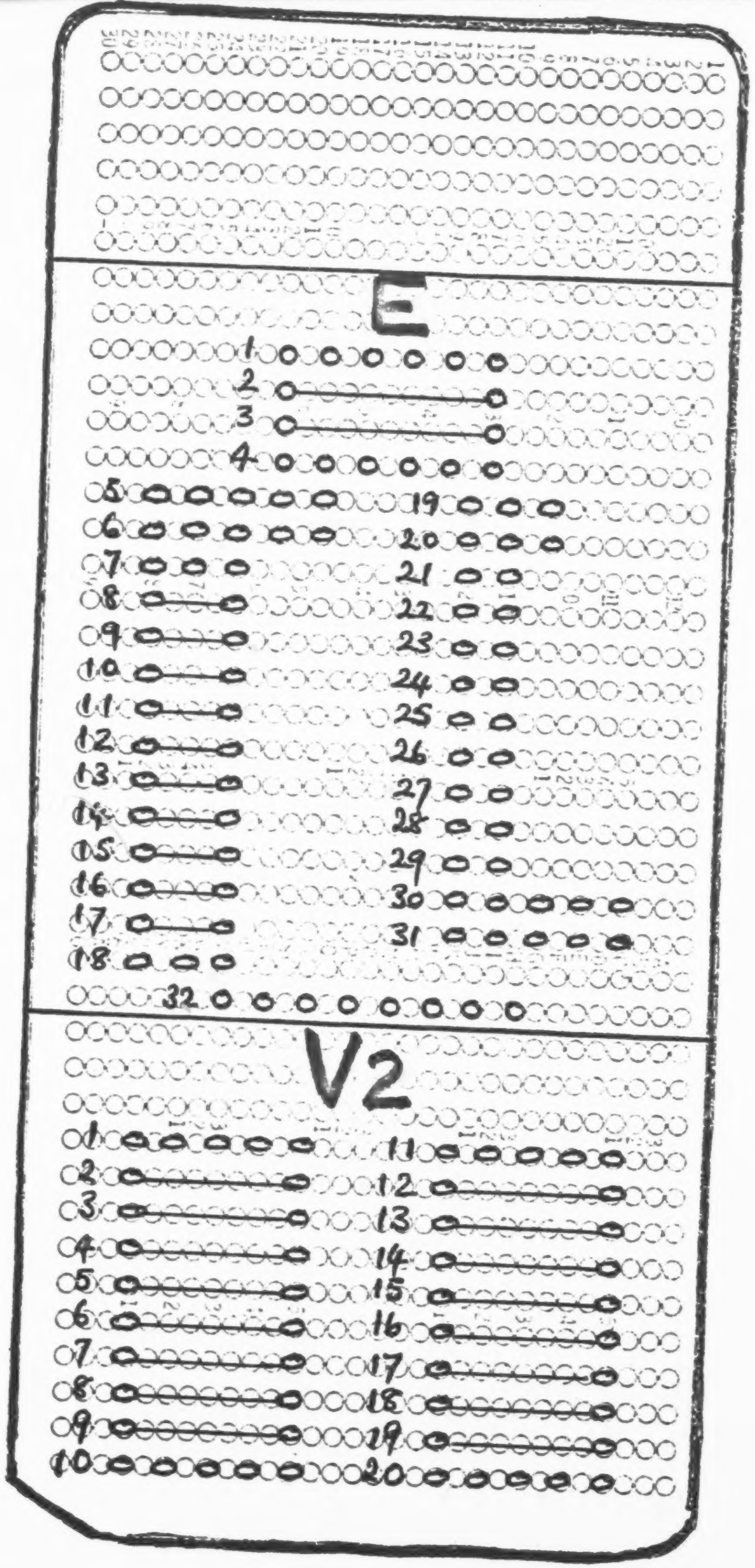
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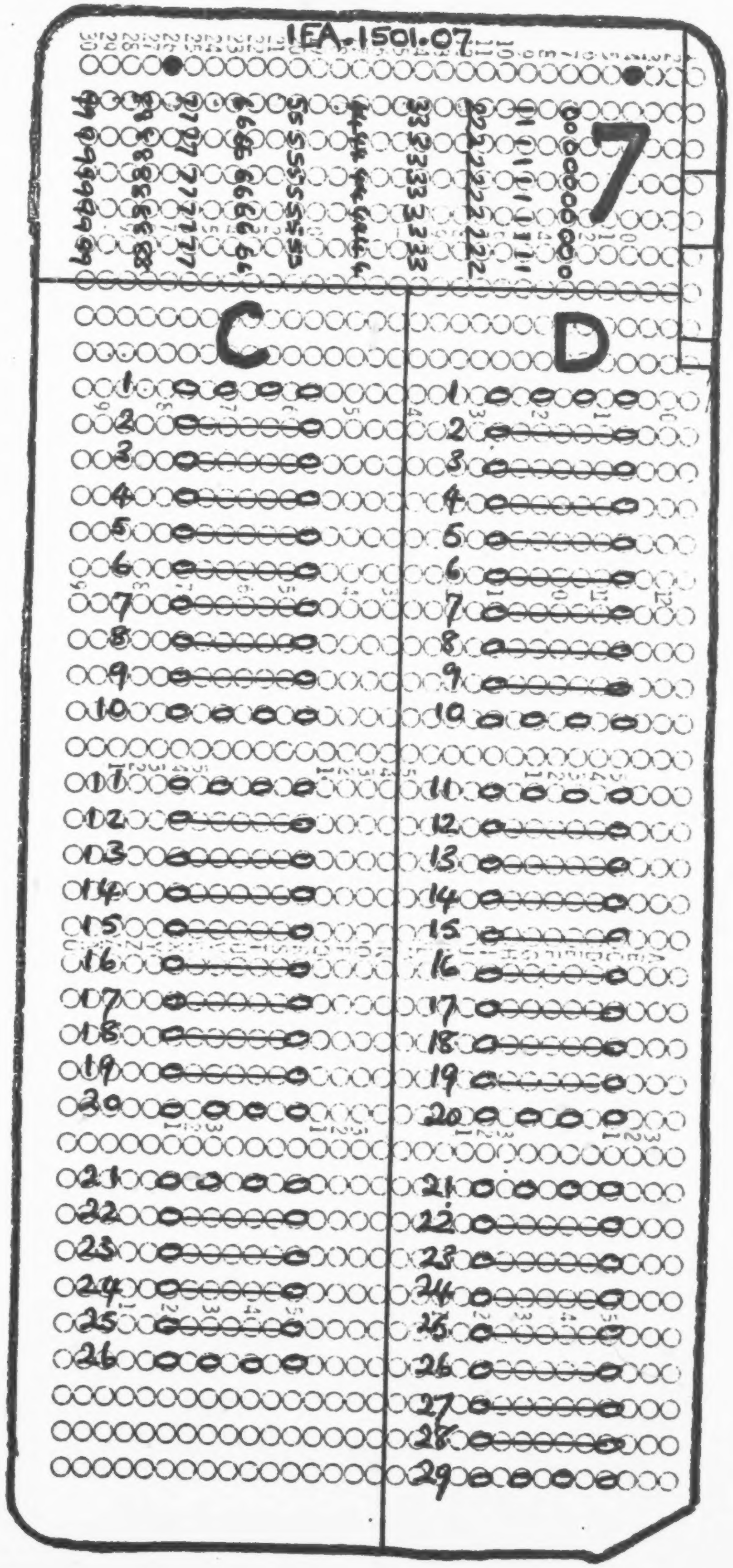
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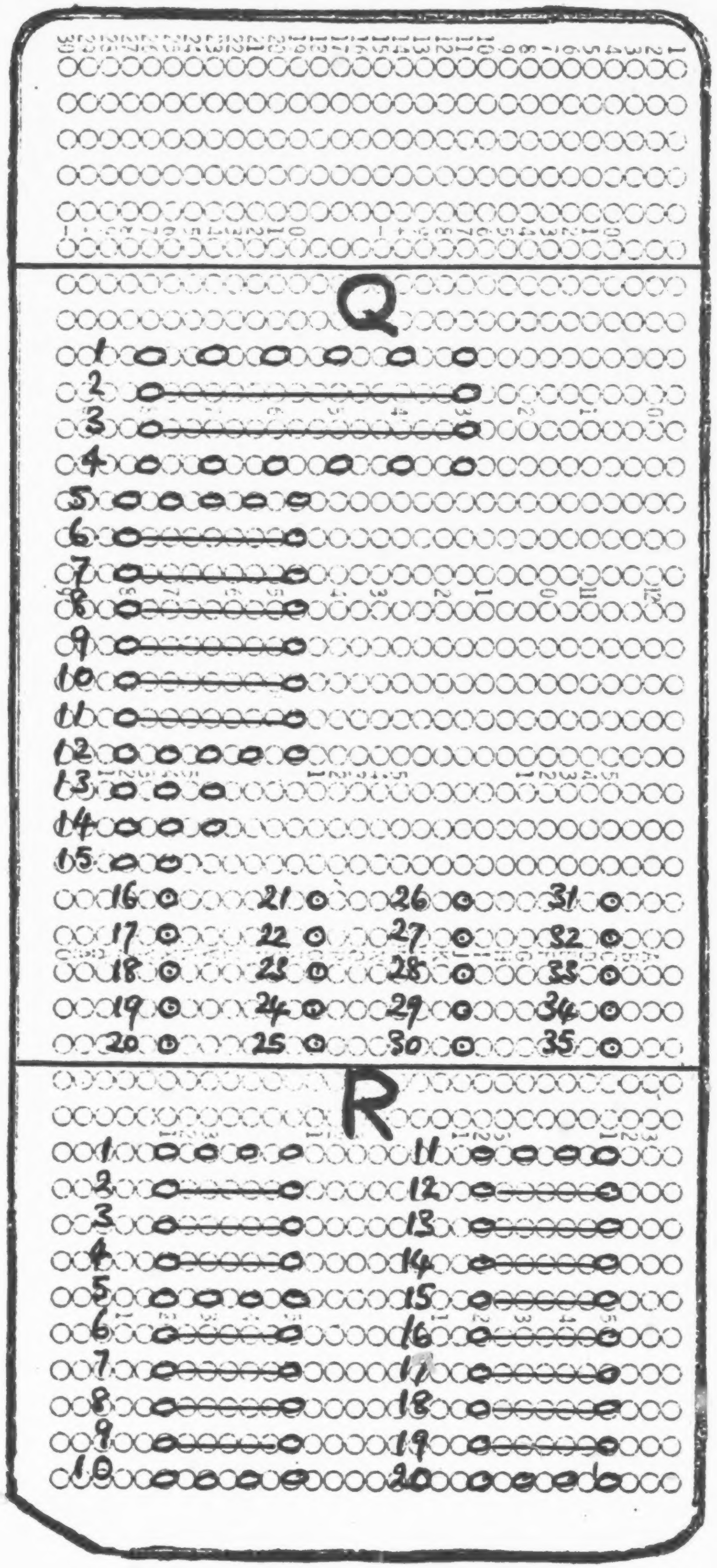
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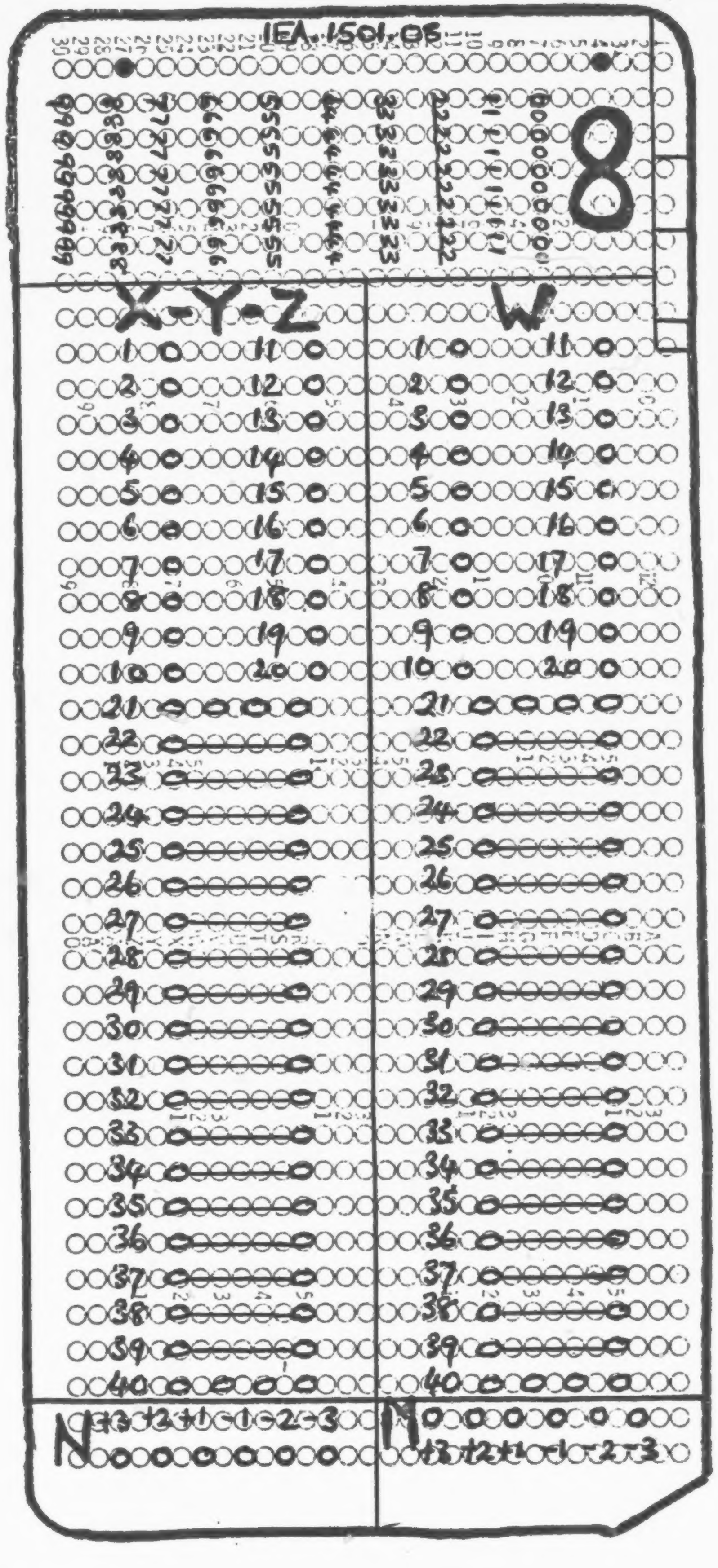
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W
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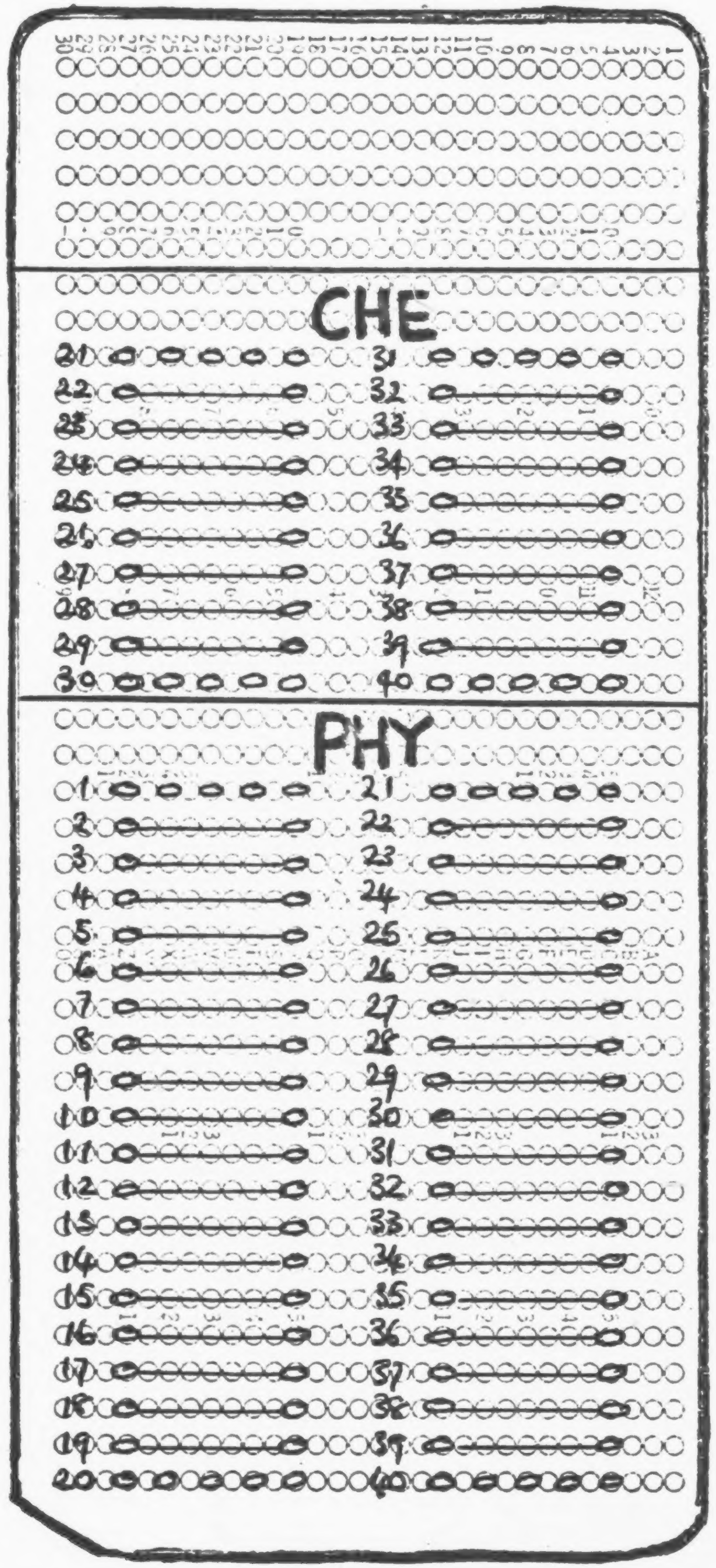
N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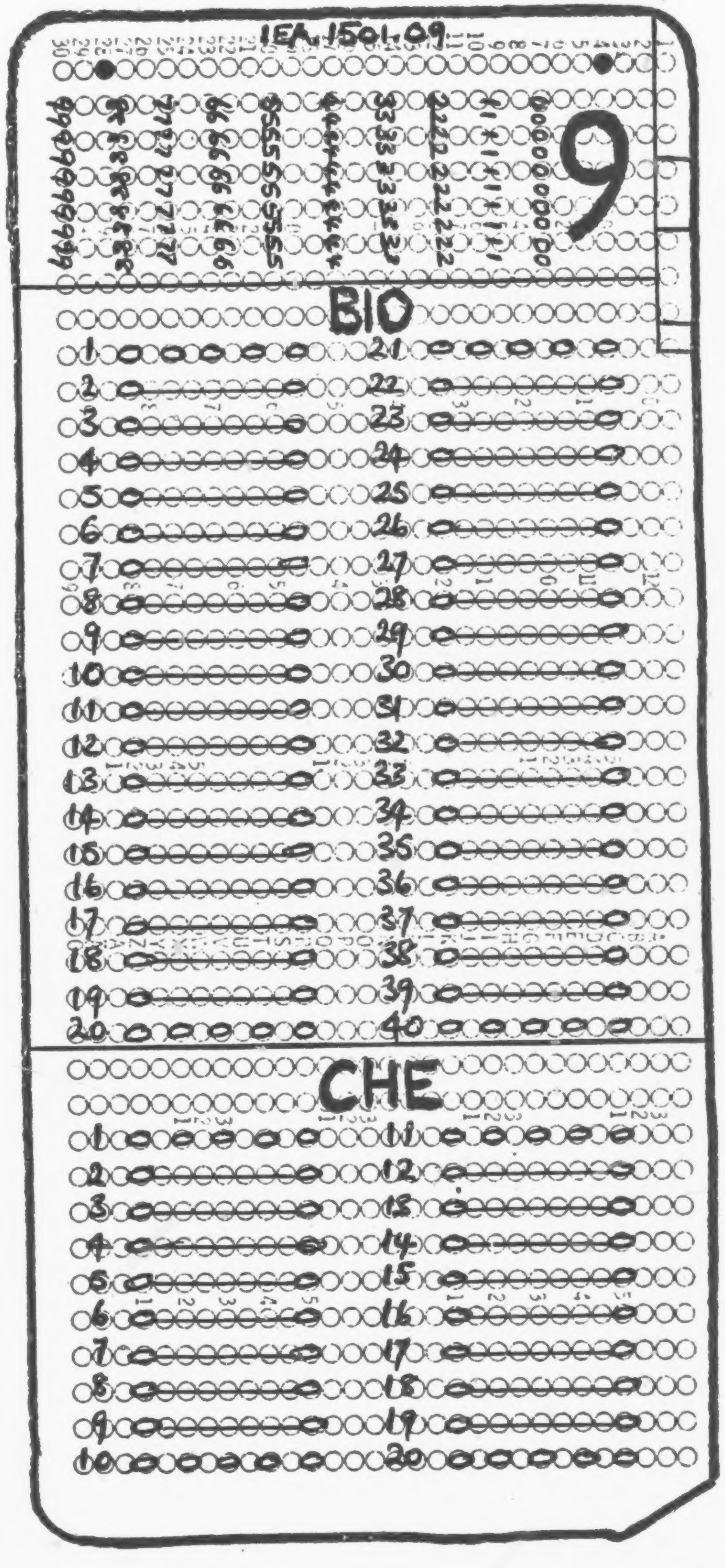
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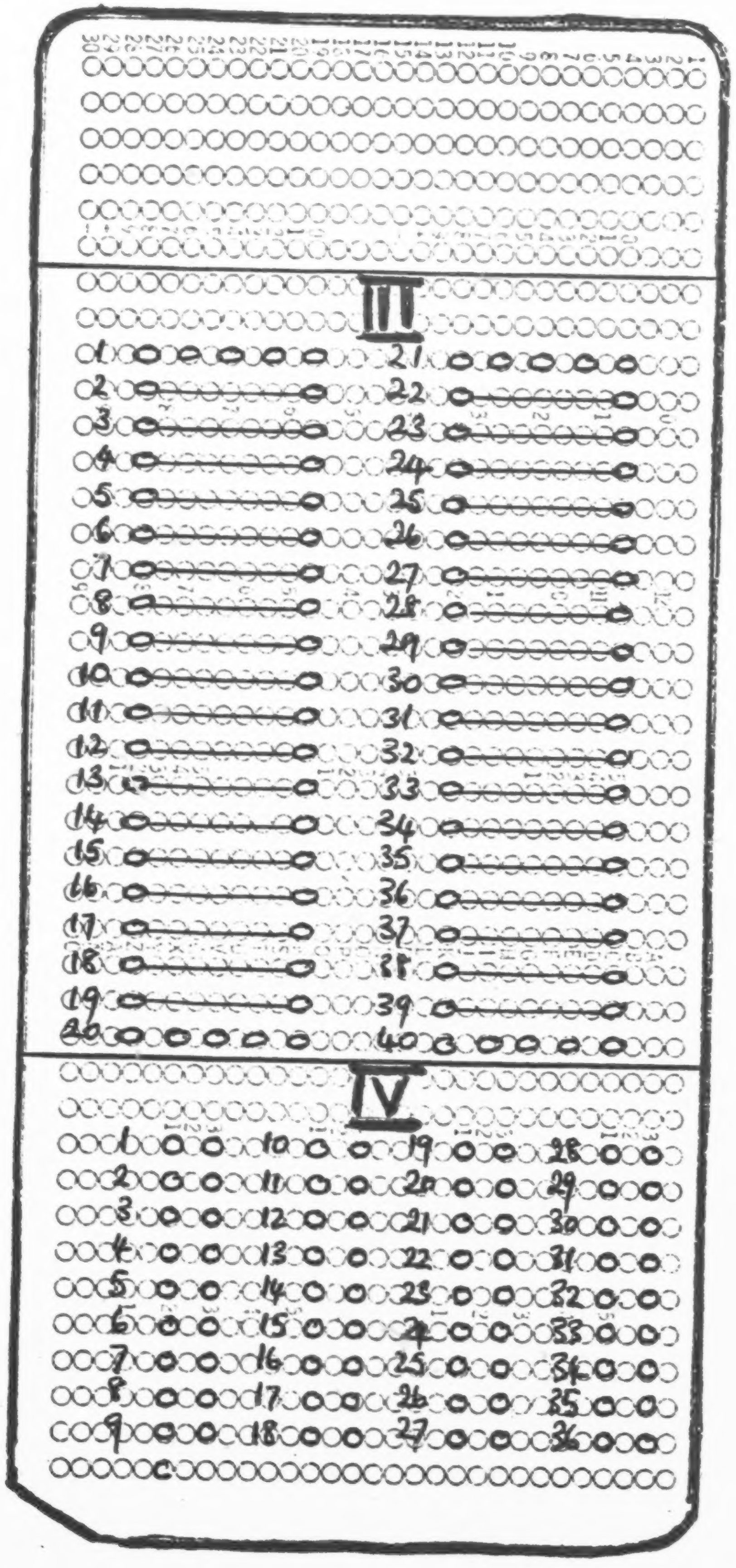
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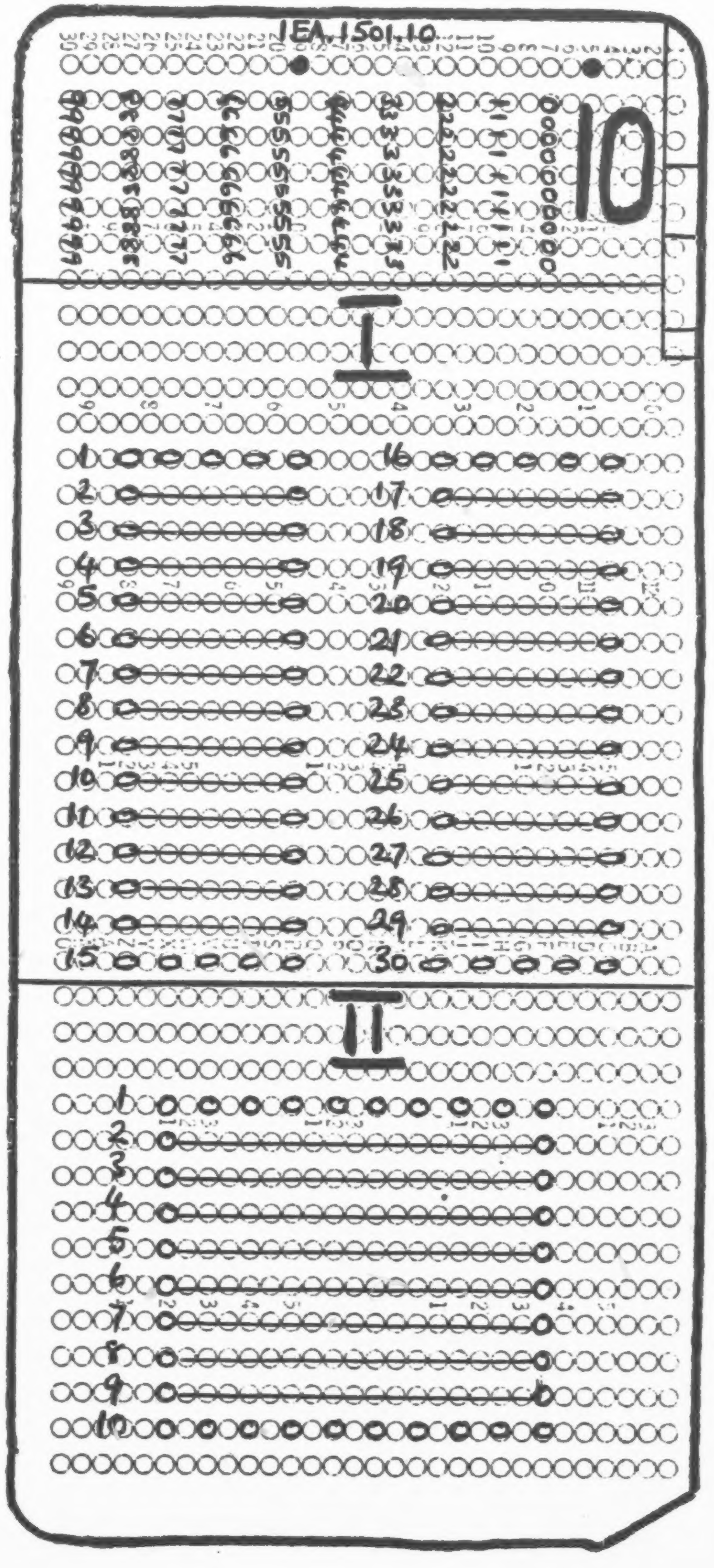
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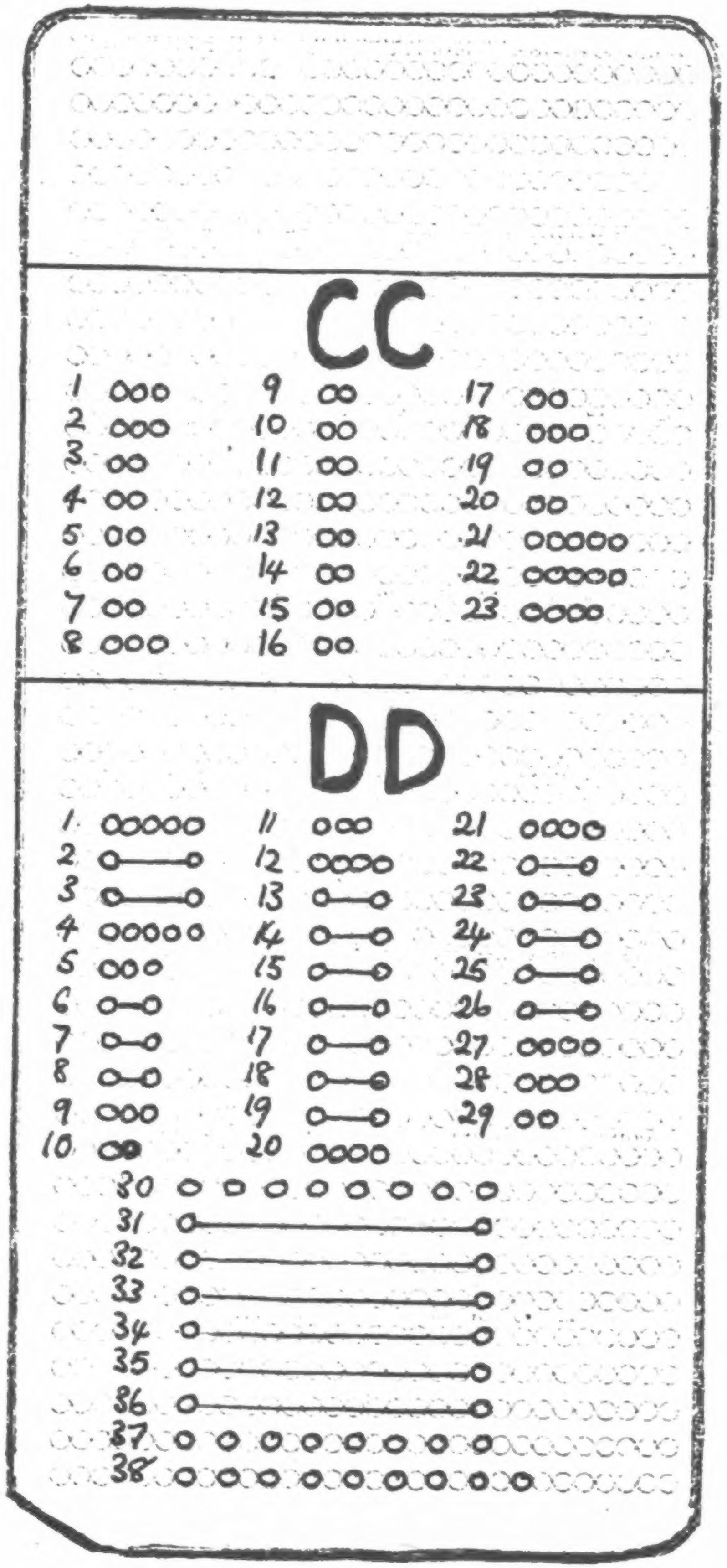
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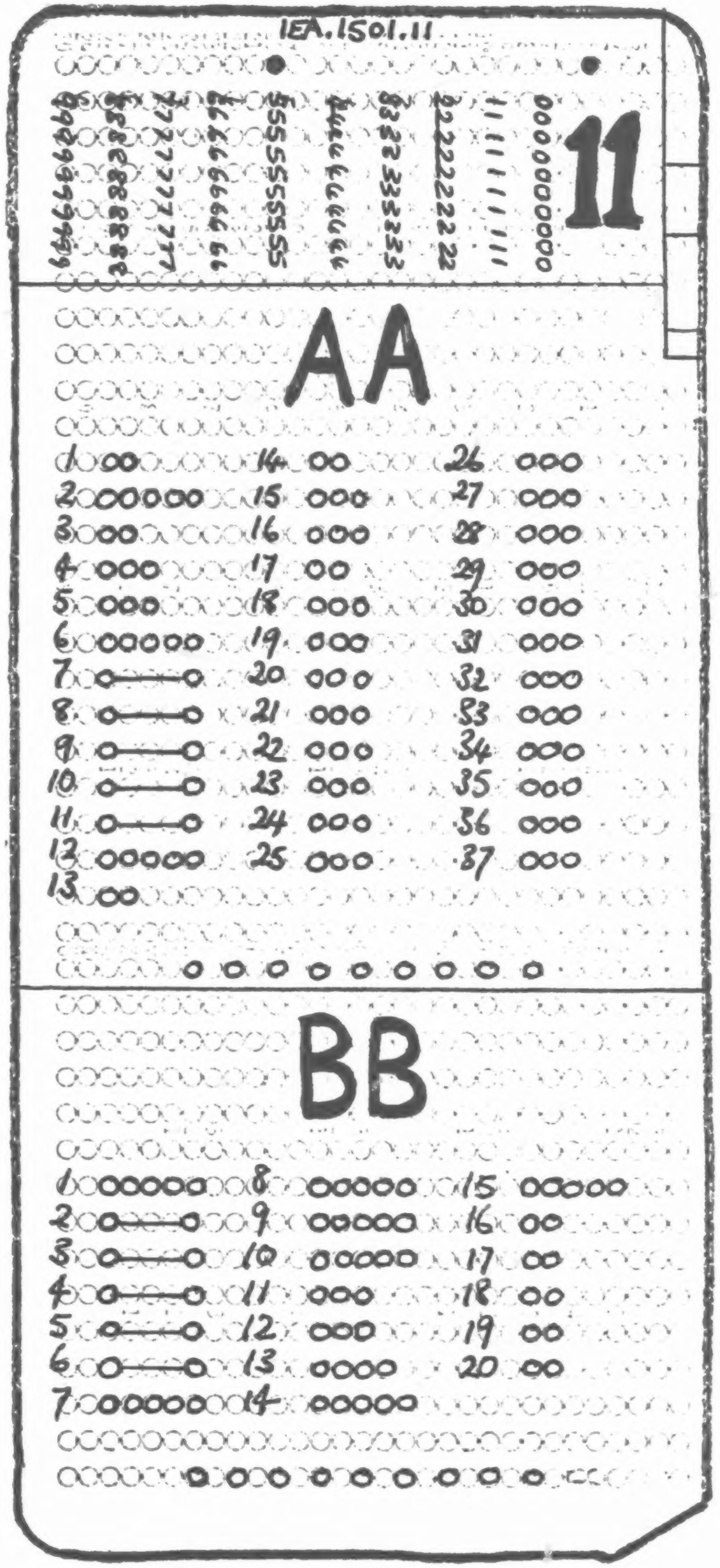
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I.E.A.

MANUAL FOR SCHOOL COORDINATORS (IEA/M2)

Manual 2

1. Introduction

Educational Research centers from different countries have on their own initiative joined together in this research project of the International Association for the Evaluation of Educational Achievement (I.E.A.). These countries are: Australia, Belgium, Chile, England, Federal Republic of Germany, Finland, France, Hungary, India, Iran, Italy, Japan, the Netherlands, Poland, Scotland, Sweden, Thailand, U.S.A. and New Zealand.(1)

The aim of the project is to study in a systematic way how the educational outcomes in certain subject areas in the different school systems are related to features of school organization, curriculum practices, teaching practices and teacher characteristics, technological factors, etc. in the countries participating in the research. The first subject area studied by IEA was mathematics where the mathematical performance of various groups of students was measured as they emerged at different points in their respective school systems. The results which were published in 1967(2) proved to be of great value to educational policy makers in many countries. IEA is now continuing its research studies in three subject areas, Science, Reading Comprehension, Literature, and next year will undertake three other subject areas: French as a Foreign Language, English as a Foreign Language and Civic Education.

The plans for the research require representative samples of students aged 10 to 11 years (Population I), students aged 14 to 15 years (Population II) and students in the pre-university grade (Population IV) to be tested in each country. Some countries are also testing groups of students leaving school between Population II and Population IV (Population III).

Apart from testing the performance in Science, Reading Comprehension, and Literature, it is also important to assess many non-cognitive aspects (e.g. attitudes) of the learning of these subjects. It should be pointed out that the Achievement Tests and the attitude measures have been constructed as the result of a great deal of pre-testing over the past three years in all the countries concerned. In order to be able to describe some background factors of the students making up the samples, information is being collected from the students themselves by means of a student questionnaire. It is thought that the way in which the children are taught particular topics in these three subjects and the organization of the school which they attend will also prove to be important and hence questionnaires are also to be completed by teachers. Finally, as far as the actual testing is concerned, it is known that verbal ability plays a great part in children's doing well at school. It would be interesting to see the relationship between this factor and performance in Science, Reading Comprehension and Literature or in certain aspects of these subjects. This is a reason for the administration of the Word Knowledge Test to the students.

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(1) Should other countries join before this is printed in each country, National Centers should of course add the names of the extra countries.

(2) Husén, Torsten (ed.) International Study of Achievement in Mathematics: A Comparison of Twelve Countries, Vols. I and II. Almqvist & Wiksell, Stockholm; John Wiley, N.Y. 1967

This is a major cross-national study in comparative education using an empirical approach. The results are likely to have important implications for the teaching of these subjects in all countries. Apart from elucidating the role of these three subjects in the schools of today, the study will bring out the relative importance of various factors in school learning. Such analyses can be made only be means of cross-national comparisons and evaluations. The study does not aim at making crude comparisons in terms of average subject area competence at certain age levels, nor does it aim at criticizing existing practices. But an investigation like the present one gives countries an opportunity to learn from each other on the basis of systemized facts.

2. The mechanics of organising an investigation of this kind are necessarily complex. Essentially, a number of "target populations" of students at different levels of schooling has been defined and, in each country, samples of students in each of these populations have been selected. The sampling scheme employed has meant that, whilst every school containing students in each of the defined populations had the same chance of being in the final sample, random choice alone actually determined which schools and hence which students would, in fact, be tested.

International definitions of the target populations have, of course, been worked out in detail. However, for administrative purposes in this country, brief operational definitions of the actual groups to be tested are given in Table 1. This table also gives details of which tests and other materials are to be given in each group.

National Centers fill in their own National Table here.

3. Receipt and Storage of Testing Material

For the sample of students to be tested for any one target population in a school, the School Coordinator will receive:

(a) a copy of the Student Name Form for the sample indicating which tests, questionnaires and answer cards are being supplied for each student to be tested.

(b) a set of Student Envelopes which contains the material designated on the Student Name Form. Each envelope will have the student's name and code number on it.

(c) a copy of the Teacher Name Form indicating which questionnaires and answer cards are being supplied for the teachers listed.

(d) a set of Teacher Envelopes which contains the material designated on the Teacher Name Form. Each envelope will have the teacher's name and code number on it.

(e) a School Questionnaire.

(f) copies of Manual 3 - Instructions for Administration.

(g) spare sets of tests and answer cards.

As soon as the above material has been received from the National Centers the School Coordinator should check that the correct number of Student and Teacher Envelopes have been supplied. If there are any deficiencies the National Centers should be contacted immediately.

National Centers to insert here their own arrangements for the replacement of missing or damaged answer cards.

The School Coordinator is responsible for the safe storage of all materials prior to testing. The materials should be locked up when not in use.

4. Days of Testing

It is important that the timetable for the administration of the tests and questionnaires be followed as closely as possible.

The timetable is given below. Should the School Coordinator have any queries, he should contact the National Center immediately.

National Centers insert timetable here - see Manual 1

5. Student Name Form

This form contains the names of those students selected to be tested. No other students should be tested. If a student has left the school since the names were selected, a horizontal red line should be drawn through the name. No further names should be added.

The tests and answer cards to be given to a particular student are all packed in order in the Student Envelope.

6. Teacher Name Form

This form contains names of those teachers who are to be requested to complete Teacher Questionnaires. If a named teacher has left the school since the names were selected, his envelope should be given to his replacement if one exists; in such circumstances the name on the front of the Teacher Envelope and Teacher Return Envelope, and Teacher Name Form should be changed. If no replacement exists, a horizontal red line should be drawn through the name on the Teacher Name Form.

General Instructions for Administration

7. It has been suggested that the information for certain questions on the Student Questionnaire can best be supplied by students' parents. If the practice of setting these questions as a home task be adopted, the necessary instructions should be entered here by the National Centers.

8. Testing Room

The ideal room for testing is one in which students will be comfortable, sufficiently well separated from one another so that there will be little opportunity or inclination to seek help from others, and free from distractions of other students coming and going. As far as possible a room should be otained that will permit good testing conditions.

There should be a test administrator to each room. He/she should be directly responsible for administering the tests.

If at all possible, there should also be an Invigilator (Proctor) who should patrol the room quietly, and ensure that answers are given in the correct places and in the correct way. However, no help should be given to students on any of the questions in the cognitive and attitudinal instruments. Help in completing questionnaire material is, however, permissible. Specific directions for each instrument are given in Manual 3.

If more than 25 or 30 students are being tested at the same time, it would be desirable to have additional assistant(s) to help with passing out papers and invigilating (proctoring) the tests.

The tests are to be answered in pencil (2B) only. It is therefore necessary for a sufficient supply of sharpened pencils to be available. A supply of rough working (scratch) paper and rubbers (erasers) is also required.

9. Briefing Test Administrators

Manual 3 (Manual for Test Administrators) gives the full details necessary for the actual administration of the tests. It is important, however, that this manual (Manual 2) should also be studied by all test administrators. The School Coordinator should complete the necessary arrangements for ensuring that the appropriate Student Envelopes are available at each agreed testing session. He should also brief the Test Administrators regarding the collection of completed answer sheets (see Manual 3) and the return to him at the end of all testing of all materials. Administrators should arrange for reading material to be available for those students who finish a test early.

10. Teacher Questionnaires

The School Coordinator is responsible for passing on the Teacher Envelopes to the appropriate teachers and to do everything possible to ensure their return, completed. (Each teacher is expected to fill in only two or three of the parts of the questionnaire. The parts which are appropriate are explained on the questionnaires themselves.) Teachers should be requested to insert their completed answer cards into the Teacher Return Envelope which can then be sealed.

CARE SHOULD BE TAKEN AT ALL TIMES TO ENSURE THAT ANSWER CARDS ARE NEVER BENT OR TORN.

The School Coordinator should collect the Teacher Return Envelopes for return to the National Center.

11. School Questionnaire

The School Coordinator is responsible for the completion of the

2

school questionnaire. It is possible that several senior members of the school staff including the school principal himself (if he, in fact, is not the coordinator) will need to be consulted. When completed, the School Questionnaire should be held ready for return to the National Center.

12. "Opportunity" to Learn

In addition to the questionnaires which are completed by teachers, it will be necessary to obtain a rating for each item in the Science tests. The rating for each item should be the collective judgement of the Science teachers. They are asked to estimate what proportion of the students in a particular target population in the school have had the opportunity to learn what is being tested by each item. In arriving at these judgements, the Science teachers should give particular attention to the process the student would have to go through to answer the question rather than the detailed content of the questions. For example, if an item required the student to calculate the change in pressure when the volume of a given quantity of gas is tripled at constant temperature, then it is the application of Boyle's Law that is being tested rather than the mere manipulation of the particular numerical quantities involved.

The School Coordinator should arrange a meeting (or meetings) of Science teachers to obtain these ratings separately for each population tested in the school. Detailed instructions are given in Question 33 on the School Questionnaire.

The School Coordinator should see that the Special School Science Answer Cards are completed with these ratings and returned with the School Questionnaire to the National Center.

13. Returning Materials to National Center

The School Coordinator is responsible for the prompt return of materials to the National Center. All the Student Envelopes, Teacher Return Envelopes and the completed School Questionnaire together with the Student Name Form and the Teacher Name Form and unused answer cards should be packaged into one parcel and returned to the National Center. Strong packaging must be employed to prevent any damage (bending, tearing, etc.) to answer cards.

All other materials (test booklets, student questionnaires, teacher questionnaires etc.) are also to be returned by separate mail to the National Center.

14. Reporting Results to Schools

Regrettably it is not possible for all the many thousands of teachers who have taken part in this research to be thanked personally. However, it is hoped that the School Coordinator will pass on the thanks of the National Center to all those who have assisted.

The information which is being returned from each participating school will in due course, find its way into computer storage at the IEA Computation Center.

The processing of all the information received from approximately half a million students from 15,000 schools in twenty countries will naturally take some time. It is intended, however, that in due course a report will be sent to each school giving the test results obtained by the students in that school. Comparative information will be supplied showing the performance of that school with other schools in their own countries and other countries.

I. E. A.

PHASE II Stage 2

Manual for Test Administrators (IEA/M3)

Manual 3.

General Instructions

1. The tests and questionnaires should be answered in pencil. Students should be provided beforehand with a sharpened pencil (2B) and an eraser. An adequate supply of spare pencils should be available.
2. The materials to be given to the students are arranged in booklets. In general, booklets contain both test and questionnaire sections.
3. For the Science tests each student should also be provided beforehand with several sheets of rough work (scratch) paper on which any figuring can be done. The test booklet and the answer card are not to be used for this purpose.
4. The tests should be timed carefully. The time limits are planned to be fairly liberal. Do not give any extra time.
5. The time limits given in the table below while they are to be followed exactly in the case of the tests, are intended only as a guide for the other materials and may be extended if necessary.

   National Centers give timetable.

   Some help may be given to individual students if they are unsure of their answers to factual questions on the questionnaire sections, but no help should be given on the opinion section or on any test. (National Centers - see General Notes for Student Questionnaires)
6. If National Centers intend to administer the National Option Science Practical Tests, then the necessary instructions should be included here about the apparatus and materials that will be required.

Detailed Instructions for Administration

Population I

Session I (85 minutes)

7. The test administrator will need the Student Envelopes for the students he is supervising. These envelopes (still closed) should be handed out to the students who are to check that they have received the envelope with their name on it.

8. The instructions that follow should be read by the test administrator clearly and with emphasis; no attempt should be made to commit them to memory. The word given should be followed exactly whenever possible.

9. When the students are in the room and quietly seated, the following statements should be made:

   "This school has been chosen as one of those in ------------------------ to take part in an international project to study what young people know about Science (and how well they understand what they read - National Center add if appropriate). Different countries from all over the world are taking part in this study. You will probably find some parts of the tests easy; some you are likely to find hard. Do your best on all the questions. Listen carefully to the instructions as they are given, follow them exactly, and do the best you can."

10. Now read the following:

    "Open the envelope in front of you. Take out Booklet 1. Do not open the booklet until you are told to do so."

11. See that all do this correctly, then say:

    "For these tests we shall use a special answer card that is separate from the test itself. With this answer card, all the tests can be scored very quickly and accurately by a special machine. From your envelope take out the smaller envelope and again check that your name is written on it. This second envelope contains your answer cards. Be careful not to mark or bend them. Take out the yellow card marked 1. Put the smaller envelope back inside the larger envelope and place it at the top of your desk (table). The answer card is a little tricky to mark the first time your use it, so listen to the instructions and follow them carefully.

For most of the questions you will be asked, there are five possible answers. These are indicated on your answer card by a raw of ovals like this."

Here, put a sample on the blackboard, like this: -

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

Say: -

"Look at what I have put on the board. These are five choices, named A, B, C, D, E. If you think the correct answer to a question is the one marked "C", you should blacken the oval with a solid pencil mark like this."

Fill in the oval C on the board.

"If you change your mind and want to change an answer, erase the first mark completely and then mark your other choice. It is important that you only leave one oval blackened in. Erase all other marks. If you look at your answer card you will see that there is a section at the top with holes in it. Do not touch this at all. Underneath that is a section marked L where we shall do some practice items and underneath that there are two sections marked A and B. These are where you will put your answers to the questions in the tests. Let me repeat that you must not put any stray marks anywhere on the card. The only marks should be where you have blackened in the ovals you have chosen. Are there any questions about the way answers are to be recorded?"

Answer any questions. Try to be sure that all students understand how they are to mark their answers.

12. Continue as follows: -

"Now look at the front cover of Booklet 1. Follow carefully while I read the directions to you."

Read the directions to the group, giving them time to mark the answers to the practice questions when these are reached.

Directions: -

"This test contains questions dealing with different parts of Science. You will be able to answer some of the questions on the basis of your school work, some from your general knowledge and others you will be able to answer by using common sense. Others you may not waste time over any question you cannot do; leave it and go on to the next question. You can come back to questions you have missed later, if you have time. You may answer even if you are not quite sure, but do not guess blindly.

Each of the questions in this test is followed by five possible answers, lettered A, B, C, D, and E. You have to decide which one answer you think best, and then on your answer card make a solid pencil mark in the oval containing the answer letter you chose.

Here is an example of how to fill in the answer space on your answer card. Remember that the examples given on this page are to be answered in the section marked L on your answer card.

1. How long does the earth take to travel once around the sun?

   A. A day
   B. A week
   C. A month
   D. A year
   E. None of the above.

Since the earth travels round the sun in a year, the answer space D should be marked. This has been done on the answer card for question 1 in the example section L.

Now try the next three questions for practice. Fill in the space of your chosen answer on the answer card in section L."

Allow one or two minutes for students to complete practice items. Then say: -

"The answer to question 2 is E. Therefore you should have marked the space E on your answer card.

The answer to question 3 is C. Therefore you should have marked the space C on your answer card.

The answer to question 4 is A. Therefore you should have marked the space A on your answer card."

It is important to ensure that all students mark their answers in the correct way and in the right place. Then say: -

"Are there any questions?"

Answer any questions about the procedure of taking the test and marking the answers.

13. Continue as follows: -

"We are now ready to start Section A. The answers to the first test are to be placed in the section marked "A" on your answer card."

Indicate the appropriate section of the answer card. Then say: -

> "If your pencil breaks, please put up your hand immediately, and I will give you another pencil. You will have 30 minutes for the test. Work as quickly as you can. Do not waste time if you cannot answer a question, but leave it and go on to the next. Open your test booklet and begin."

Note what the time is when the group starts, also what time it will be after 15 and 25 minutes have passed.

After 15 minutes say: -

> "About half the time has gone. Remember, do not waste time on the questions you do not know how to do."

After 25 minutes say: -

> "You have about 5 minutes more. Have a look at any questions you haven't yet tried, to see if you know how to do some of them."

After 30 minutes say: -

> "Time is up. Stop working and put your pencil down. You will have a few minutes rest. Do not touch your test booklet or answer card."

After a few minutes (National Centers should suggest an appropriate length of time) say: -

> "We are not ready to start Section B. The answers to questions in this section are to be marked in part B of your answer card."

Indicate section B of the answer card. Then say: -

> "You will have 30 minutes for this test. Remember, do not waste time if you cannot answer a question, but leave it out and go on to the next. Turn to the next page in your booklet and begin."

Note what the time is when the group starts, also what time it will be after 15 minutes and 25 minutes have passed. After 15 minutes say: -

"About half the time has gone. Remember, do not waste time on the questions you do not know how to answer."

After 25 minutes say: -

"You have about 5 minutes more. Have a look at any questions you haven't yet to see if you know how to answer some of them."

After 30 minutes say: -

"Stop working and put your pencil down. You will now have a few minutes rest. Do not touch your test booklet or answer card."

After a few minutes say:

"We are now ready to start Section K, which is the next section in your booklet. The answers to this section are to be marked in part K on the otherside of your answer card."

Indicate part K of the answer card.

14. "Follow the directions on the first page of Section K as I read them to you. These questions are being given to a number of children in several countries to find out what they think about science and the part it plays in their lives. For most of the questions there are no right or wrong answers so this is not a test, we just want to know what you think. The answers to these questions should be put in Section K on your answer card. Blacken in the oval which has the letter of the answer you chose for each question. If you wish to change an answer you have given, you may, but be sure to erase the mark for the old answer. Now turn the page to the first set of questions and begin."

15. When all the students have completed Section K, tell them to replace the answer card in the small envelope. The test booklet and the small

envelope should now be put back into the large envelope, which can be left on the desk or table to await the next testing session. (National Centers may wish to have the envelopes collected if the next testing sessions will not be until a much later time.)

Session 2 (35 minutes)

16. The students should be seated in the same way as before, and the test administrator should ensure that each student has his envelope on his desk in front of him.

17. Now say:

> "From your large envelope take out Booklet No. 2. In this sessions you will not need an Answer Card - you will mark your responses in your booklet."

Make sure that the students have taken out the right booklet.

Then say:

> "In this test words are given to you in pairs. You must decide whether the words have nearly the same meaning or nearly the opposite meaning. If you think the words have the same meaning, draw a ring round the letter "s". If you think the words have the opposite meaning, draw a ring round the letter "o" in your booklet. Here is an example:"

Put the following example on the blackboard like this:

high	low	s	o

Then say:

> "The two words "high" and "low" both refer to height. However, they are nearly opposite in meaning. Therefore, you should draw a ring round the letter "o" like this."

Here draw a ring round the letter "o" on the board. Then say:

> "If you change your mind, remember you must erase the ring completely and then put a ring round your other choice. Are

there any question?"

Answer any questions. Try to be sure that all students understand how they are to mark their answers.

18. Continue as follows:

"You will have ten minutes for this test. Work as quickly as you can, and do not waste time on words you do not know. Now turn over to the first page of Booklet 2 and do the questions in section F."

Note what time it is when the group starts. After 5 minutes say:

"About half the time is gone."

After 10 minutes say:

"Stop working and put your pencils down."

19. Then say:

"The questions in the next section (Section G) are about you and what you do. Answer them as accurately as you can. If you have any difficulty about understanding what is wanted by a particular question, please ask me. You should be able to answer all the questions within 15 minutes. Now turn to the next page and begin Section G.

Help may be given to any student who appears to be in difficulty. It will be appreciated that the information requested in this section should be as accurate as possible and every assistance should be given to attain this end.

(Note to National Centers: See General Notes 2 and 3 and add other instructions, if appropriate.)

20. After all students have completed Section G, say:

"That is the end of Section G. We are now ready to start Section H."

(National Centers: These are general attitude scales and the instructions for Section H will be sent later.)

When everyone has finished, tell the students to replace the booklet in the envelope.

Session 3 (60 minutes)

21. The students should be seated in the same way as before, and the test administrators and proctors should ensure that each student has his envelope on his desk in front of him.

22. Say:

"From your large envelope take out Booklet 3. From the small envelope take out the pink answer card marked 2. Be careful not to bend the answer card. Put the small envelope back inside the large envelope and place it at the top of your desk (table)."

A check should now be made to see that all students have ready

Booklet 3 and Card 2.

Then say:

"You are now going to do some tests to see how well you understand what you read. You should mark the spaces on your answer card in the same way as you did for the Science tests. Now look at the front of Booklet 3 and follow while I read the instructions. This test is made up of four stories with a number of questions on each. Read the first story and then answer the questions on each. Then go on to the second story and so on until you come to the end of Section C. Each question has four possible answers. Pick the best ending or answer and blacken the oval on the answer card which has the same letter as the answer you have chosen. You may read the story over again as much as you need to. Try each question in turn. If you don't know the answer, leave it and go on to the next question. You may come back to it later if you have time. Please answer even if you aren't quite sure. However, do not guess blindly. When you finish one story go on to the next. Continue until you reach the end of Section C. If there is time left, go back and try to do any that you omitted."

23. Then say:

"Remember the answers to Section C are to be made on your answer card in the section marked C."

Indicate the appropriate section of the answer card. Then say:

"You will have 25 minutes for this test. Now turn over the page and begin."

Note: Proctors should made sure that students are continuing with all of the stories within one section and not stopping after the first story.

After 13 minutes say:

"About half the time has gone. Remember, do not waste time on the questions you do not know the answer to."

After 20 minutes say:

"You have five minutes more."

After 25 minutes say:

"Stop working and put your pencils down. You will now have a few minutes rest. Do not touch your test booklet or answer card."

After a few minutes say:

"We are now ready to start Section D. The answers to Section D are to be made on your answer card in the section marked D."

Indicate the appropriate section of the answer card. Then say:

"The questions in Section D are like those you have just completed. You will have 25 minutes for this section. Now turn over the page and begin.

After 13 minutes say:

"About half the time has gone. Remember, do not waste time on the questions you cannot answer."

After 20 minutes say:

"You have five minutes more."

After 25 minutes say:

"Stop working and put your pencil down."

Tell the students to replace the answer card in the small envelope, and put this back in the large envelope. Give the students a few minutes rest.

24. Note: For this test, the test administrator will need an accurate stop watch.

After a few minutes say:

"Now we are going to have a test to see how quickly you can read. First we shall have a practice test. Turn to Section P of your booklet. Follow the directions while I read them. Here is a story. The story has many little parts. When you come to the end of a part, there will be three words like this : one two three."

Here write on the blackboard:

one two three

Say:

"Put a line under the word that fits in the story. For this test you underline the words in the booklet. Read as fast as you can, and see how many parts of the story you can read and work in the time that you have. Remember read as fast as you can, but be sure to mark the right word after each part of the story.

Then say:

"Are there any questions?"

Answer any questions. Try to be sure that all students understand how they are to mark their answers. Then say:

"Turn over the page and begin."

At the end of four minutes say:

"Stop working and put your pencil down."

Then say:

"This has been a practice test only. Are there any questions on how you are to do this test?"

Answer any questions, then say:

"Put Booklet No. 3 back into the large envelope and take out the Booklet 3-J. The test in this booklet is exactly the same as the practice test. You must read the story as quickly as you can and underline the right word after each part of the story. You will have four minutes for this. Are you ready? Begin."

After four minutes say:

"Stop working and put your pencil down."

Tell the students to put the Booklet 3J into the envelope. Make sure that all booklets and answer cards are back in the envelopes. The small envelopes should be inside the large envelopes. Tell the students to seal the large envelopes. Collect them.

National Centers are to enter here the instructions to the Test Administrators on how the envelopes are to be collected, and to the School Coordinator on the procedure for returning the envelopes.

Population II

Session I (65 minutes)

25. The test administrator will need the Student Envelopes for the students he is supervising. The Student Envelopes (still closed) should be handed out to the students, who are to check that they have received the envelope with their name on it.

26. The instructions that follow should be read by the test administrator clearly and with emphasis: no attempt should be made to commit them to memory. The wording given should be followed exactly wherever possible.

27. When the students are in the room and seated, the following statement should be made:

> "This school has been chosen as one of those to take part in an international project to study what young people know about Science, (and how well they understand what they read - National Centers add if appropriate). Different countries from all over the world are taking part in this study. You will probably find some parts of the tests easy; some you are likely to find hard. Do your best on all the questions. Listen carefully to the instructions as they are given; follow them exactly and do the best you can."

28. Now read the following:

> "Open the envelope in front of you. Take out Booklet Number 4. Do not open the booklet until you are told to do so."

29. See that all do this correctly, then say:

> "For this test we shall use a special answer card that is separate from the test itself. With this answer card, all the tests can be scored quickly and accurately by a special machine. From your envelope take out the smaller envelope and check that your name is written on it. This second

envelope contains your answer cards. Be careful not to tear or bend them. Take out the yellow card marked 3. Put the second envelope back inside the larger envelope and place it on the top of your desk (table). The answer card is a little tricky to mark the first time you use it, so listen to the instructions and follow them carefully.

"For most of the questions you will be asked, there are five possible answers. These are indicated on your answer card by a row of ovals like this".

Put a sample on the blackboard like this: -

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

Say: -

"Look at what I have put on the board. There are five choices, A, B, C, D, and E. If you think the correct answer to a question is the one marked "C", you should blacken the oval with a solid pencil mark like this."

Fill in the oval "C" on the board.

"If you change your mind and want to change an answer, erase the first mark completely and then mark your other choice. It is important that you only leave one oval blackened for any question. Erase all other marks. If you look at your answer card you will see that there is a section at the top with holes punched in it. Do not touch this at all. Underneath that is a section marked L, where we shall do some practice items and underneath that is a section marked A. This is where you will put your answers to the questions in the test. Let me repeat that you must not put any marks anywhere else on the card. The only marks should be where you have blackened in the ovals you have chosen. Are there any questions about what you have been told?"

Answer any questions. Be sure that all students know how to mark their answers.

30. Continue as follows: -

"Now look at the front cover of Booklet 4. Follow carefully while I read the directions to you."

Read the directions to the group, giving them time to mark the answers to the practice questions when these are reached.

Directions: -

"This test contains questions dealing with different parts of Science. You will be able to answer some of the questions on the basis of your school work, some from your general knowledge and others you will be able to answer using common sense. Others you may not be able to do. Do not waste time over any question you cannot do; leave it and go on to the next question. You can come back to questions you have missed later if you have time. You may answer even if you are not quite sure, but do not guess blindly.

Each of the questions in this test is followed by five possible answers, lettered A, B, C, D and E. You have to decide which one answer you think best and then on your answer card make a solid pencil mark on the oval containing the answer letter you chose.

Here is an example of how to fill in the answer space on your answer card. Remember that the examples given on this page are to be answered in the section marked L on your answer card.

1. How long does the earth take to travel once around the sun?

   A. A day
   B. A week
   C. A month
   D. A year
   E. None of the above

Since the earth travels round the sun in a year, the answer D should be marked. This has already been done on the answer card for question 1 in the example section L.

Now try the next three questions for practice. Fill in the space of your chosen answer on the answer card in section L."

Allow one or two minutes for students to complete items.

Then say: -

"The answer to question 2 is E. Therefore you should have marked the space E on your answer card.

The answer to question 3 is C. Therefore you should have marked the space C on your answer card.

The answer to question 4 is A. Therefore you should have marked the space A on your answer card."

It is important to ensure that all students mark their answers in the correct way and in the right place.

Then say: -

"Are there any questions?"

Answer any questions about the procedure of taking the test and marking the answers.

31. Continue as follows: -

"We are now ready to begin Section A. The answers to the test are to be placed in the section marked A on your answer card."

Indicate the appropriate section of the answer card. Then say: -

"If your pencil breaks, please put up your hand immediately and I will give you another pencil. You will have 60 minutes for this test. Work as quickly as you can. Do not waste time if you cannot answer a question, but leave it and go on to the next. Are there any questions?"

Answer any questions. When students are sure of the procedure, say: -

"Open your test booklets and begin."

After 30 minutes say: -

"About half the time has gone. Remember do not waste time on questions you do not know how to do."

After fifty-five minutes say: -

"You have about five minutes more, have a look at any questions you have not tried to see if you know how to do some of them."

After sixty minutes say: -

"Stop working and put your pencils down."

Now say: -

"This is the end of the first testing session. We are going to replace the materials in the envelope in such a way that they will be ready for the next session. Open the large envelope and take out the small envelope that contains the answer cards. (Give the students a few moments to do this.) Put answer card 3 into this small envelope. Now put the small envelope and Booklet 4 into the large envelope."

When the students have done this, the envelopes can be collected and the students dismissed until the next session.

Session 2 (60 minutes)

The students should be seated in the same way as before and the test administrator should ensure that each student has his own envelope in front of him on the desk.

Now say: -

"Take out Booklet 4 from your envelope. Also, take out the small envelope of answer cards and remove the yellow answer card number 3. (Hold up a copy of Booklet 4 and the yellow answer card number 3 to indicate what materials the students are supposed to have in front of them) Put the small envelope inside the large envelope and place it on the top of your desk."

Then say: -

"We are now ready to begin Section B. The answers to questions in this section are to be marked in part B on the answer card. Find part B on your answer card."

Indicate Section B on the answer card. Then say: -

"You will have sixty minutes for Section B of the test. Remember do not waste time if you cannot answer a question, but leave it and go on to the next. Are there any questions?"

Answer any questions. When you have done this say: -

"Now turn to page (National Centers supply page number) and begin working."

Note what the time is when the group starts, also the time it will be after thirty minutes and fifty-five minutes are past. After thirty minutes say: -

"About half the time has gone. Remember not to waste time on questions you do not know how to answer."

After fifty-five minutes say: -

"You have about five minutes more. Take a look at any questions you have not tried yet to see if you know how to answer them."

After sixty minutes say: -

"Stop working and put your pencils down."

32. Tell the students to replace the answer card in the small envelope with the answer cards. Then tell them to put the test Booklet and the small envelope in the large envelope. This is the end of Session 2.

Session 3 (50 minutes)

33. The students should be seated in the same way as before and the test administrator should ensure that each student has his own envelope in front of him on the desk.

34. Now say: -

"Take out Booklet 5 from your envelope. Also take the answer card 4 (National Centers to be informed of the colour later) from the small envelope of answer cards."

Check to see that the students have taken out the appropriate booklet and answer card.

35. Now say: -

"Booklet 5 contains a number of questions about you and your study of Science. It is not a test. You are to answer the questions in this section as accurately as you can.
You will record your answers to the questions in this section on answer card 4 in Section S on the front of your card. As before, you will indicate your answers by blackening in the oval that corresponds to the answer you chose."

Make sure that all students know where to record their answers on the answer card. Ask the students if they have any questions.

Then say: -

"Turn over the page and begin."

36. After all students have completed Section S, say: -

"That is the end of Section S. We are now ready to start Section T.
The questions in this section deal with how scientists work.
In answering the questions, read each question, choose the best answer and mark your choice in Section T on the answer card. Are there any questions?"

Make sure that students understand what they are to do. Then say: -

"Begin working."

After ten minutes say: -

"About half the time has gone. Remember, do not waste time on the questions you do not know how to do."

After twenty minutes say: -

"Stop working and put your pencils down. You will now have a few minutes rest. Do not touch your test booklet or answer card."

After a few minutes (National Centers should suggest an appropriate length of time) say: -

"Turn over your answer card to Section K. We are now ready to start Section K. In this section you will mark your answers to the questions in the appropriate place in Section K on the answer card."

Point out Section K on the answer card.

"You will have about fifteen minutes to answer the questions in this section. Read the directions on the first page of Section K. When you have finished, turn over the page and begin. Section K is the last section in this booklet. You are to answer all the rest of the questions in this booklet and mark your answers in Section K on your answer card."

37. When all students have completed Section K, tell them to replace the answer card in the small envelope. The test booklet and the small envelope should then be put back into the large envelope which can be left on the desks or tables, to await the next testing session. (National Centers may wish to issue an instruction to collect the envelopes, if the next testing session is at a much later time.)

Session 4 (40 minutes)

38. The students should be seated in the same way as before. The test administrator should ensure that each student has his own envelope on his desk in fron of him.

39. Tell the students to take out Booklet 6 and the white answer card 5. Make sure that the students have taken out the right booklet and card. Then say: -

"In this test, words are given to you in pairs. You must decide whether the words have nearly the same meaning, or nearly the opposite meaning. If you think the words have the same meaning, blacken in the oval with a "+" in Section F of your answer card. If you think the words have nearly the opposite meaning, blacken in the oval with an "o" in it. Here is an example:"

Put the following example on the blackboard, like this:

high low + o

Then say: -

"The two words "high" and "low" both refer to height; however, they are nearly opposite in meaning. Therefore, you should blacken in the oval with the "o" in it, like this."

Fill in the oval with an "o", then say: -

"If you change your mind, remember you must erase your mark completely and then mark the other choice. Are there any questions?"

Answer any questions.

40. Continue as follows:

"You will have ten minutes for this test. Work as quickly as you can and do not waste time on any words you do not know. Now turn over the page and do the questions in Section F."

Note what time it is when the group starts. After five minutes say: -

"About half the time is gone."

After ten minutes say: -

"Stop working and put your pencils down."

"The questions in the next section (Section G) are about you and what you do. Answer them as accurately as you can. If you have any difficulty in understanding what is wanted by a particular question, please ask me. The answers to the questions on the first page of Section G are to be written in the booklet. Please answer the questions on the first page of Section G now."

After the students have had time to do this, say: -

"The answers to the rest of the questions in Section G are to be marked in Section G on the back of the answer card."

Indicate Section G on the answer card.

"Are there any questions?"

Answer any questions. Then say: -

"You may begin."

After all the students have completed Section G, say: -

"This is the end of Section G. Now open the large envelope and take out the small one which contains the answer cards. Take out the white answer card 6 and put answer card 5 back into the envelope. (Hold up answer card 6) Now put the smaller envelope inside the large envelope and place it at the top of your desk (table)."

(National Centers - these are General Attitude Scales. Directions for Section H will be sent later.)

When everybody has finished, tell the students to replace the answer card into the small envelope and the test booklet, and the small envelope into the large envelope. (National Centers may wish to issue an instruction about the collection of materials here.)

Session 5 (50 minutes)

41. The students should be seated in the same way as before. The test administrator should ensure that each student has his envelope on his desk in front of him. Then say: -

"From your large envelope take out Booklet 7. From the small envelope of answer cards, take out the pink answer card number 7. You are now going to do some tests to see how well you can read. You should fill in the ovals on your answer card in the same way as you did for the other tests. Look at the front of Booklet 7 and follow while I read the instructions.

This is a test to see how well you understand what you read. The test is made up of four stories with a number of questions on each. Read the first story and then answer the questions on it. Then go on to the second story and so on until you come to the end of Section C.

"Each test item starts with a statement or question and then gives you four endings or answers. Pick the best ending or answer and blacken the space corresponding to the answer you have chosen on your answer card. You may read the stories over again as much as you need to. Try each question in turn. If you don't know the answer you may leave it and go on to the next. Come back to it later if you have time.

"You should answer even if you aren't sure; however, do not guess blindly.

"When you finish one story, go ahead to the next. Keep on working until you reach the end of Section C. If there is any time left go back and try to do any questions that you skipped the first time through."

42. Then say: -

"The answers to the questions in Section C should be marked in Section C on your answer card. You will have fifty minutes to do this test. Are there any questions?"

Make sure that the students know where to mark their answers on the answer card. Then say: -

"Turn over the page and begin working."

After twenty-five minutes say: -

"About half the time has gone. Remember, do not waste time on the questions you do not know how to do."

After forty-five minutes say: -

"You have about five minutes more."

After fifty minutes say: -

"Stop working and put your pencils down."

43. Tell the students to replace their booklets and answer cards in the large envelope. This is the end of Session 5. (National Centers may wish to issue an instruction regarding the collection of envelopes at this point.)

Session 6 (50 minutes)

44. The students should be seated in the same way as before and the test administrator should make sure that each student has his own envelope in front of him on the desk.

45. Then say: -

"From your large envelope take out Booklet 7 and your pink answer card 7. You are going to take another test to find out how well you read. The answers to the questions will be marked in Section D of your answer card. Turn to Section D of your booklet. You will have fifty minutes to do this test. Are there any questions?"

Answer any questions. Then say: -

"Turn over the page and begin."

After twenty-five minutes say: -

"About half the time has gone. Remember do not waste time on the questions you do not know how to answer."

After forty-five minutes say: -

"You have about five minutes more."

After fifty minutes say: -

"Stop working and put your pencils down."

46. Tell the students to put the booklet and answer card back into the large envelope. That is the end of this testing session. (National

may wish to issue an instruction about the collection of the envelopes at this point.)

Session 7 (30 minutes)

47. The students should be seated in the same way as before and the test administrator should ensure that each student has his envelope in front of him on his desk.

48. Then say: -

"Take Booklet 7 and the pink answer card 7 out of your envelope and turn to Section E in the booklet. The questions in this section are about you and what you read. The answers to these questions are to be marked in Section E of answer card 7. You will have about fifteen minutes to answer these questions. If you are not sure what is wanted by a particular question, please ask me. Are there any questions?"

Make sure that the students know what they are supposed to do and where to mark their answers. Then say: -

"Turn over the page and begin."

49. After all the students have completed Section E, say: -

"That is the end of Section E. Put answer card 7 back into the small envelope and put the small envelope into the large envelope. We are now ready to start Section P."

Note: For this test, the test administrator will need an accurate stop watch.

Then say: -

"Now we are going to have a test to see how quickly you can read. First we shall have a practice test. Turn to Section P in Test Booklet 7. Follow as I read the directions.

Here is a story. The story has many little parts. When you come to the end of a part there will be three words, like this:

one two three

"Put a line under the word that fits in the story. For this test you underline the word in the booklet.

Read as fast as you can, and see how many parts of the story you can read and mark in the time that you have.

Remember, read as fast as you can, but be sure to mark the right word after each part of the story. Are there any questions?"

Answer any questions. Try to be sure that all students understand how they are to mark their answers. Then say: -

"Turn over the page and begin."

At the end of exactly four minutes, say: -

"Stop working and put your pencils down."

Then say: -

"This has been a practice test only. Do you understand how to do this test?"

Answer any questions then say: -

"Put Booklet 7 back into the large envelope. Take out Booklet 7G. This test is exactly the same as the practice test. You must read the stories as quickly as you can and underline the right word after each of the stories. You will have four minutes for this. Are there any questions?"

Answer any questions, then say: -

"Begin."

After exactly four minutes say: -

"Stop working and put your pencils down."

Tell the students to put the Booklet 7G into the envelope. Make sure that all booklets and answer cards are back in the envelopes. The small envelope should be inside the large envelope. That is the end of the session. (National Centers may wish to issue an instruction about the collection of materials at this point.)

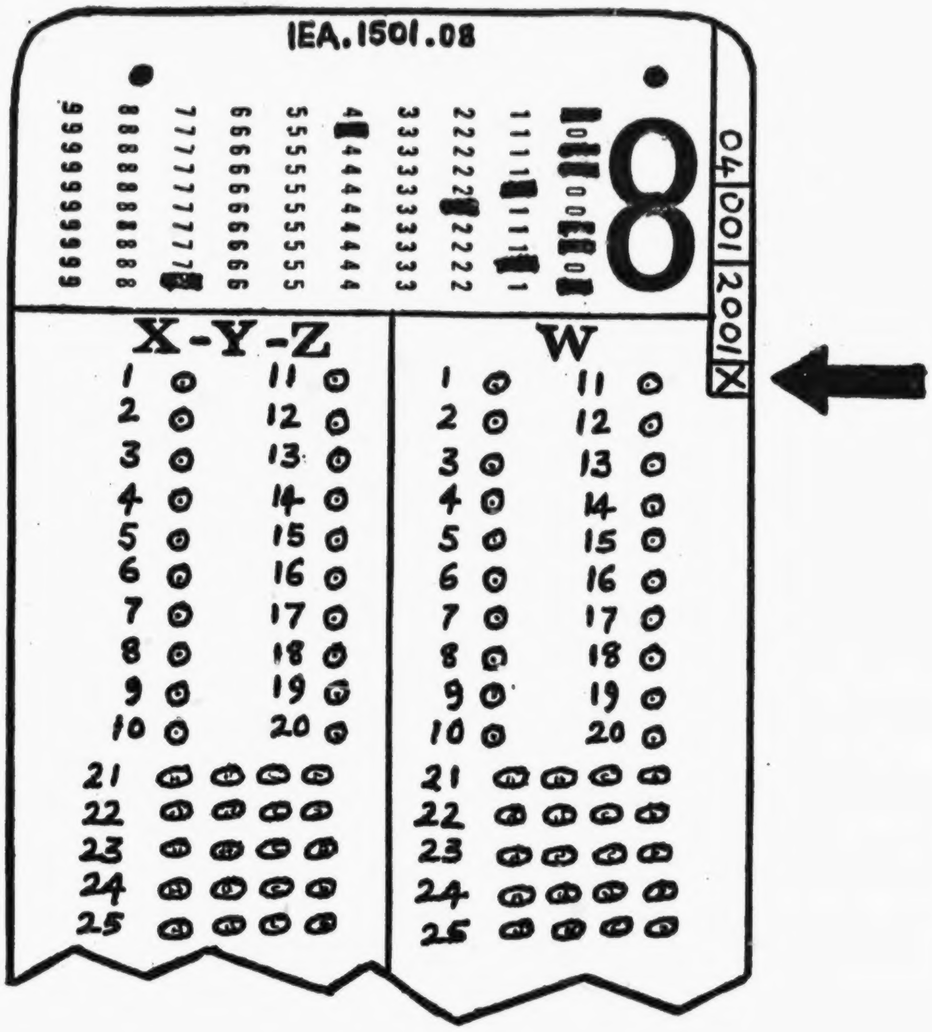
Session 8 (50 minutes)

50. The students should be seated in the same way as before and the test administrator should ensure that each student has his own envelope on his desk in front of him.

51. Now say: -

> "From your envelope take out Booklet 8 and answer card 8. The section letter on the first page of the booklet will be either an X, a Y, or a Z. There are some numbers and letters printed at the top of your card by the large figure 8. The last of these will be either an X, a Y, or a Z. Make sure that this letter is the same as the one on the front of your test booklet."

(The test administrator should hold up a copy of Booklet 8 and answer card 8 to indicate where the two should match).



This is the letter that should match the letter on the front of the test booklet.

If any student finds that his answer card does not match the test, then the test administrator should correct the discrepancy by giving him a correct booklet. The student should not be allowed to change answer cards. When all students are ready, say: -

> "In this booklet there is a short story. Read the story carefully and thoughtfully before going on to the questions about it. Read the questions carefully and answer them as thoughtfully and accurately as you can. The questions are preceded by instructions which you should follow. All your answers should be marked on your answer card in the Section marked X -Y -Z. You will have fifty minutes to do this test. Are there any questions?"

Answer any questions and make sure that the students know what they are to do. Then say: -

> "Turn over the page and begin."

After twenty-five minutes say: -

> "About half the time has gone. Remember do not waste time on any questions you do not know how to answer."

After forty-five minutes say: -

> "You have about five minutes more. If you have not answered question N, which comes at the end, please do so now. If after doing this you have any time left, you may go back to any questions you have not answered."

After fifty minutes say: -

> "Stop working and put your pencils down."

Tell the students to put answer card 8 and the test booklet into the large envelope. That is the end of this session. (National Centers may wish to issue an instruction about the collection of materials at this time.)

Session 9 (50 minutes)

52. The students should be seated in the same way as before and the test administrator should ensure that each student has his own envelope on his desk in front of him.

53. Then say: -

> "Take out Test Booklet 9 and answer card 8 from the large envelope."

Make sure that students have done this correctly. Now say: -

> "This test is like the last one you did. The answers to the questions are to be marked in Section W on the front of your answer card. You will have fifty minutes to do this test. Are there any questions?"

Answer any questions and make sure that the students know where to mark their answers. Then say: -

> "Turn over the page and begin."

After twenty-five minutes say: -

> "About half the time has gone. Remember, do not waste time on any questions you do not know how to answer."

After forty-five minutes say: -

> "You have about five minutes more. If you have not answered question M, which comes at the end, please do so now. If after doing this you have any time left, you may go back to any questions you have not answered."

After fifty minutes say: -

> "Stop working and put your pencils down."

Tell the students to put answer card 8 and Test Booklet 9 into the large envelope. That is the end of this session. (National Centers may wish to issue an instruction about the collection of materials at this time.)

Session 10 (30 minutes)

54. The students are to be seated in the same way as before and the test

administrator should ensure that each student has his envelope on the desk in front of him. Then say: -

"Take out Booklet 9 and answer card 8 from the large envelope. Find Section Q on the answer card. (Hold up an answer card and indicate Section Q.)

The questions in this section are about you and your study of Literature. The answers to the questions in Section Q should be marked in Section Q on the answer card. Answer the questions as accurately as you can. If you have any difficulty understanding what is wanted by a particular question, please ask me. You should be able to answer all the questions in this section within fifteen minutes. Are there any questions?"

Make sure that the students understand what they are to do and where to mark their answers. Then say: -

"Now turn over the page and begin."

After the students have finished answering the questions in Section Q, say: -

"Turn to Section R of your test booklet. The next set of questions are also about Literature. Answer them as quickly and as accurately as you can. Mark your answers in the spaces in Section R of your answer card. You will have about fifteen minutes to complete this section. Are there any questions?"

Make sure students understand what they are to do and say and where to record their answers. Then say: -

"Now turn the page and begin."

After the students have completed Section R, tell them to return the answer card to the small envelope and to put the small envelope and the test booklet into the large envelope. Then tell the students to seal the large envelope.

55.a National Centers who are administering National Option tests should insert the appropriate instructions at the end of this session. Students should not be told to seal their envelopes until they have completed all tests.

55.b National Centers are to enter here the instructions to the test administrator on how the envelopes are to be collected, and to the School Coordinator on the procedure for the return of the envelopes to the National Center.

Population IV

Session I (65 minutes)

56. The test administrator will need the Student Envelopes for the students he is supervising. The Student Envelopes (still closed) should be handed out to the students, who are to check that they have received the envelope with their name on it.

57. The instructions that follow should be read by the test administrator clearly and with emphasis: no attempt should be made to commit them to memory. The wording given should be followed exactly wherever possible.

58. When the students are in the room and seated, the following statement should be made:

> "This school has been chosen as one of those to take part in an international project to study what young people know about Science, (and how well they understand what they read - National Center add if appropriate). Different countries from all over the world are taking part in this study. You will probably find some parts of the tests easy; some you are likely to find hard. Do your best on all the questions. Listen carefully to the instructions as they are given; follow them exactly and do the best you can."

59. Now read the following:

> "Open the envelope in front of you. Take out Booklet Number 10. Do not open the booklet until you are told to do so."

60. See that all do this correctly, then say:

> "For this test we shall use a special answer card that is separate from the test itself. With this answer card, all the tests can be scored quickly and accurately by a special machine. From your envelope take out the smaller envelope

and check that your name is written on it. This second envelope contains your cards. Be careful not to tear or bend them. Take out the yellow card marked 3. Put the second envelope back inside the larger envelope and place it on the top of your desk (table). The answer card is a little tricky to mark the first time you use it, so listen to the instructions and follow them carefully."

"For most of the questions you will be asked, there are five possible answers. These are indicated on your answer card by a row of ovals like this."

Put a sample on the blackboard, like this: -

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

Say: -

"Look at what I have put on the board. These are five choices, A, B, C, D, and E. If you think the correct answer to a question is the one marked "C", you should blacken the oval with a solid pencil mark like this."

Fill in the oval "C" on the board.

"If you change your mind and want to change an answer, erase the first mark completely and then mark your other choice. It is important that you only leave one oval blackened for any question. Erase all other marks. If you look at your answer card you will see that there is a section at the top with holes punched in it. Do not touch this at all. Underneath that is a section marked L, where we shall do some practice items and underneath that is a section marked A. This is where you will put your answers to the questions in the test. Let me repeat that you must not put any marks anywhere else on the card. The only marks should be where you have blackened in the ovals you have chosen. Are there any questions about what you have have been told?"

Answer any questions. Be sure that all students know how to mark their answers.

61. Continue as follows: -

> "Now look at the front cover of Booklet 10. Follow carefully while I read the directions to you."

Read the directions to the group, giving them time to mark the answers to the practice questions when these are reached.

Directions: -

> "This test contains questions dealing with different parts of Science. You will be able to answer some of the questions on the basis of your school work, some from your general knowledge and others you will be able to answer using common sense. Others you may not be able to do. Do not waste time over any question you cannot do; leave it and go on to the next question. You can come back to questions you have missed later if you have time. You may answer even if you are not quite sure, but do not guess blindly.
>
> Each of the questions in this test is followed by five possible answers, lettered A, B, C, D and E. You have to decide which one answer you think best and then on your answer card make a solid pencil mark on the oval containing the answer letter you chose.
>
> Here is an example of how to fill in the answer space on your answer card. Remember that the examples given on this page are to be answered in the section marked L on your answer card.
>
> 1. How long does the earth take to travel once around the sun?
>
> A. A day
> B. A week
> C. A month
> D. A year
> E. None of the above

Since the earth travels round the sun in a year, the answer D should be marked. This has already been done on the answer card for question 1 in the example section L.

Now try the next three questions for practice. Fill in the space of your chosen answer on the answer card in section L."

Allow one of two minutes for students to complete items.

Then say: -

"The answer to question 2 is E. Therefore you should have marked the space E on your answer card.

The answer to question 3 is C. Therefore you should have marked the space C on your answer card.

The answer to question 4 is A. Therefore you should have marked the space A on your answer card."

It is important to ensure that all students mark their answers in the correct way and in the right place.

Then say: -

"Are there any questions?"

Answer any questions about the procedure of taking the test and marking the answers.

62. Continue as follows: -

"We are now ready to begin Section A. The answers to the test are to be placed in the section marked A on your answer card."

Indicate the appropriate section of the answer card. Then say: -

"If your pencil breaks, please put up your hand immediately, and I will give you another pencil. You will have 60 minutes for this test. Work as quickly as you can. Do not waste time if you cannot answer a question, but leave it and go on to the next. Are there any questions?"

Answer any questions. When students are sure of the procedure, say: -

"Open your test booklets and begin."

After 30 minutes say: -

"About half the time has gone. Remember do not waste time on questions you do not know how to do."

After fifty-five minutes say: -

"You have about five minutes more, have a look at any questions you have not tried to see if you know how to do some of them."

After sixty minutes say: -

"Stop working and put your pencils down."

Now say: -

"This is the end of the first testing session. We are going to replace the materials in the envelope in such a way that they will be ready for the next session. Open the large envelope and take out the small envelope. Now put the small envelope and Booklet 10 into the large envelope."

When the students have done this, the envelopes can be collected and the students dismissed until the next session.

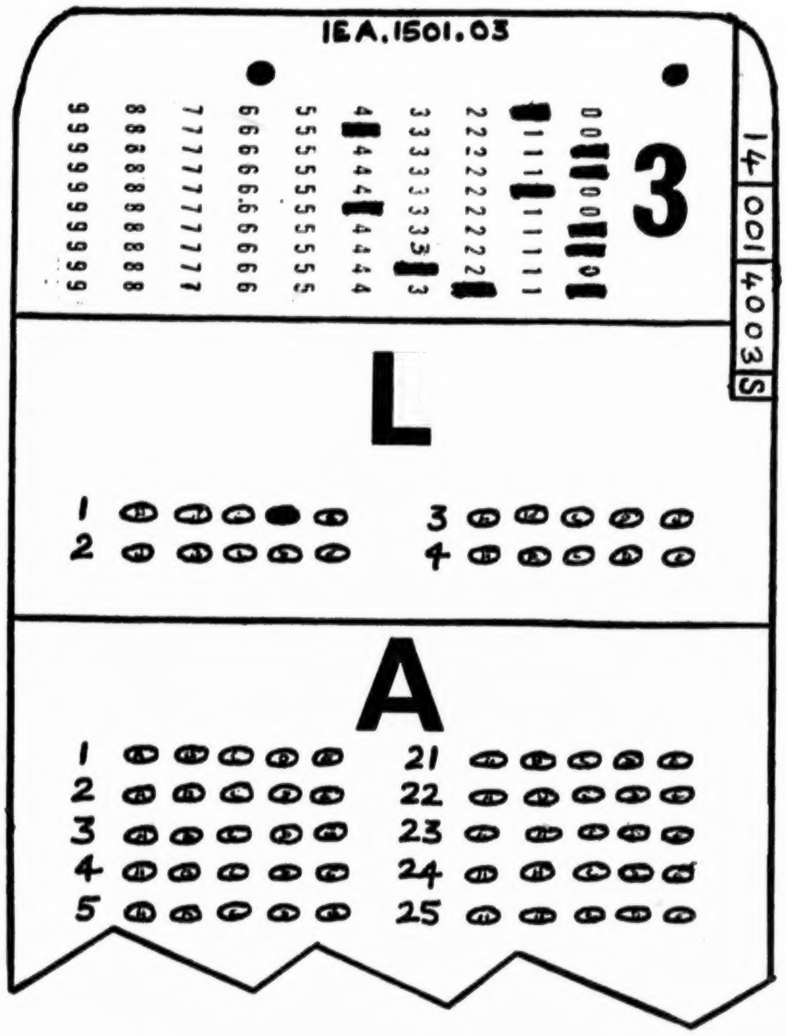
Session 2 (60 minutes)

The students should be seated in the same way as before and the test administrator should ensure that each student has his own envelope in front of him on the desk.

Now say: -

"Take out Booklet 11 and answer card number 3. On the front of Booklet 11 is a letter. It will be either a "P", a "Q" an "R", an "S", a "T" or a "U". Also on your answer card there is a column of letters and numbers at the top right hand edge by the large number 3. The last of these will also be a "P", a "Q", an "R", an "S", a "T" or a "U". Make sure this letter is the same as the one on your test booklet.

(The test administrator should hold up a copy of Booklet 11 and answer card 3 and show where they should match.)



This is the letter that should match the letter on the front of the test booklet.

If any student finds that the answer card does not match the test, then the test administrator should correct the discrepancy by giving him the correct booklet. The student should not be allowed to change answer cards.

Then say: -

> "We are now ready to begin Section B. The answers to questions in this section are to be marked in part B on the answer card. Find part B on your answer card."

Indicate Section B on the answer card. Then say: -

> "You will have sixty minutes for Section B of the test. Remember do not waste time if you cannot answer a question, but leave it and go on to the next. Are there any questions?"

Answer any questions. When you have done this say: -

> "Now turn to page (National Centers supply page number) and begin working."

Note what the time is when the group starts, also the time it will be after thirty minutes and fifty-five minutes are past. After thirty minutes say: -

"About half the time has gone. Remember not to waste time on questions you do not know how to answer."

After fifty-five minutes say: -

"You have about five minutes more. Take a look at any questions you have not tried yet to see if you know how to answer them."

After sixty minutes say: -

"Stop working and put your pencils down."

63. Tell the students to replace the answer card in the small envelope with the other answer cards. Then tell them to put the test booklet and the small envelope in the large envelope. This is the end of Session 2.

Session 3 (50 minutes)

64. The students should be seated in the same way as before and the test administrator should ensure that each student has his own envelope in front of him.

65. Now say: -

"Take out Booklet 12 from your envelope. Also take out the (color to be determined later of which the National Centers will be informed) answer card 4 from the small envelope of answer cards."

Check to see that the students have taken out the appropriate booklet and answer card.

66. Now say: -

"Booklet 12 contains a number of questions about you and your study of Science. It is not a test. You are to answer the questions in this section as accurately as you can.

You will record your answers to the questions in this section on answer card 4 in Section S on the front of your card. As before, you will indicate your answers by blackening in the oval that corresponds to the answer you chose."

Make sure that all students know where to record their answers on the answer card. Ask the students if they have any questions.

Then say: -

"Turn over the page and begin."

67. When all students have completed Section S, say: -

"That is the end of Section S. We are now ready to start Section T. The questions in this section deal with how scientists work. In answering the questions, read each question. choose the best answer and mark your choice in Section T on the answer card. Are there any questions?"

Make sure that the students understand what they are to do. Then say: -

"Begin working."

After ten minutes say: -

"About half the time has gone. Remember, do not waste time on the questions you do not know how to do."

After twenty minutes say: -

"Stop working and put your pencils down. You will now have a few minutes rest. Do not touch your test booklet or answer card."

After a few minutes (National Centers should suggest an appropriate length of time) say: -

"Turn over your answer card to Section K. We are now ready to start Section K. In this section you will mark your answers to the questions in the appropriate place in Section K on the answer card. (Point out Section K on the answer card). You will have about fifteen minutes to answer the questions in this section. Read the directions on the first page of Section K. When you have finished, turn over the page and begin. Section K is the last section in this booklet. You are to answer all the rest of the questions in this booklet and record your answers in Section K on your answer card."

68. When all students have completed Section K, tell them to replace the answer card in the small envelope. The test booklet and the small envelope should then be put back into the large envelope, which can be left on the desks or tables, to await the next testing session. (National Centers may wish to issue an instruction to collect the envelopes, if the next testing session is at a much later time.)

Session 4 (40 minutes)

69. The students should be seated in the same way as before. The test administrator should ensure that each student has his envelope on his desk in front of him.

70. Tell the students to take out Booklet 13 and the white answer card 5. Make sure that the students have taken out the right booklet and card. Then say: -

"In this test, words are given to you in pairs. You must decide whether the words have nearly the same meaning, or nearly the opposite meaning. If you think the words have the same meaning, blacken in the oval with a "+" in Section F of your answer card. If you think the words have nearly the opposite meaning, blacken in the oval with an "o" in it. Here is an example:"

Put the following example on the blackboard, like this:

high   low   +   o

Then say:

"The two words "high" and "low" both refer to height; however, they are nearly opposite in meaning. Therefore, you should blacken in the oval with the "o" in it, like this."

Fill in the oval with an "o". Then say: -

"If you change your mind, remember you must erase your mark completely and then mark the other choice. Are there any questions?"

Answer any questions.

71. Continue as follows:

"You will have ten minutes for this test. Work as quickly as you can and do not waste time on any words you do not know. Now turn over the page and do the questions in Section F."

Note what time it is when the group starts. After five minutes say: -

"About half the time is gone."

After ten minutes say: -

"Stop working and put your pencils down."

"The questions in the next section (Section G) are about you and what you do. Answer them as accurately as you can. If you have any difficulty in understanding what is wanted by a particular question, please ask me. The answers to the questions on the first page of Section G are to be written in the booklet. Please answer the questions on the first page of Section G now."

After the students have had time to do this, say: -

"The answers to the rest of the questions in Section G are to be marked in Section G on the back of the answer card."

Indicate Section G on the answer card.

"Are there any questions?"

Answer any questions. Then say : -

"You may begin."

After all the students have completed Section G, say: -

> "This is the end of Section G. Now open the large envelope and take out the small one which contains the answer cards. Take out the white answer card 6 and put answer card 5 back into the envelope. (Hold up card 6) Now put the smaller envelope inside the large one and place it at the top of your desk (table)."

(National Centers - these are General Attitude Scales. Directions for Section H will be sent later.)

When everybody has finished, tell the students to replace the answer card into the small envelope and the test booklet, and the small envelope into the large envelope. (National Centers may wish to issue an instruction about the collection of materials here.)

Session 5 (50 minutes)

72. The students should be seated in the same way as before. The test administrator should ensure that each student has his envelope on his desk in front of him. Then say: -

> "From your large envelope take out Booklet 14. From the small envelope of answer cards, take out the pink answer card number 7. You are now going to do some tests to see how well you can read. You should fill in the ovals on your answer card in the same way as you did for the other tests. Look at the front of Booklet 14 and follow while I read the instructions.
>
> This is a test to see how well you understand what you read. The test is made up of four stories with a number of questions on each. Read the first story and then answer the questions on it. Then go on to the second story and so on until you come to the end of Section C.

Each test item starts with a statement or question and then gives you four endings or answers. Pick the best ending or answer and blacken the space corresponding to the answer you have chosen on your answer card. You may read the stories over again as much as you need to. Try each question in turn. If you don't know the answer you may leave it and go on to the next. Come back to it later if you have time. You should answer even if you aren't sure; however, do not guess blindly. When you finish one story, go ahead to the next. Keep working until you reach the end of Section C. If there is time left, go back and try to do any that you skipped the first time through."

73. Then say: -

"The answers to the questions in Section C should be marked in Section C on your answer card. You will have fifty minutes to do the test. Are there any questions?"

Make sure that the students know where to mark their answers on the answer card. Now say: -

"Turn over the page and begin working."

After twenty-five minutes say: -

"About half the time has gone. Remember, do not waste time on the questions you do not know how to do."

After forty-five minutes say: -

"You have about five minutes more."

After fifty minutes say: -

"Stop working and put your pencils down."

74. Tell the students to replace their booklets and answer cards in the large envelope. This is the end of Session 5. (National Centers may wish to issue an instruction regarding the collection of envelopes at this point.)

Session 6 (50 minutes)

75. The students should be seated in the same way as before, and the test administrator should make sure that each student has his envelope in front of him on his desk.

76. Then say: -

> "From your large envelope take out Booklet 14 and your pink answer card 7. You are going to take another test to find out how well you read. The answers to the questions will be marked in Section D of your answer card. Turn to Section D of your booklet. You will have fifty minutes to do this test. Are there any questions?"

Answer any questions. Then say: -

> "Turn over the page and begin."

After twenty-five minutes say: -

> "About half the time has gone. Remember, do not waste time on the questions you do not know how to answer."

After forty-five minutes say: -

> "You have about five minutes more."

After fifty minutes say: -

> "Stop working and put your pencils down."

77. Tell the students to put the booklet and answer card back into the large envelope. That is the end of this testing session. (National Centers may want to issue an instruction about the collection of the envelopes at this point.)

Session 7 (15 minutes)

78. The students should be seated in the same way as before, and the test administrator should ensure that each student has his envelope in front of him on his desk.

79. Then say: -

> "Take Booklet 14 and the pink answer card 7 out of your envelope and turn to Section E in the booklet. The questions

in this section are about you and what you read. The answers to these questions are to be marked in Section E of answer card 7. You will have about fifteen minutes to answer these questions. If you are not sure of what is wanted by a particular question, please ask me. Are there any questions?"

Make sure that the students know what they are supposed to do and where to mark their answers. Then say: -

"Turn over the page and begin."

80. After all the students have completed Section E, say: -

"That is the end of Section E. Put answer card 7 back into the small envelope and put the small envelope into the large envelope. Also put Booklet 14 back into the envelope."

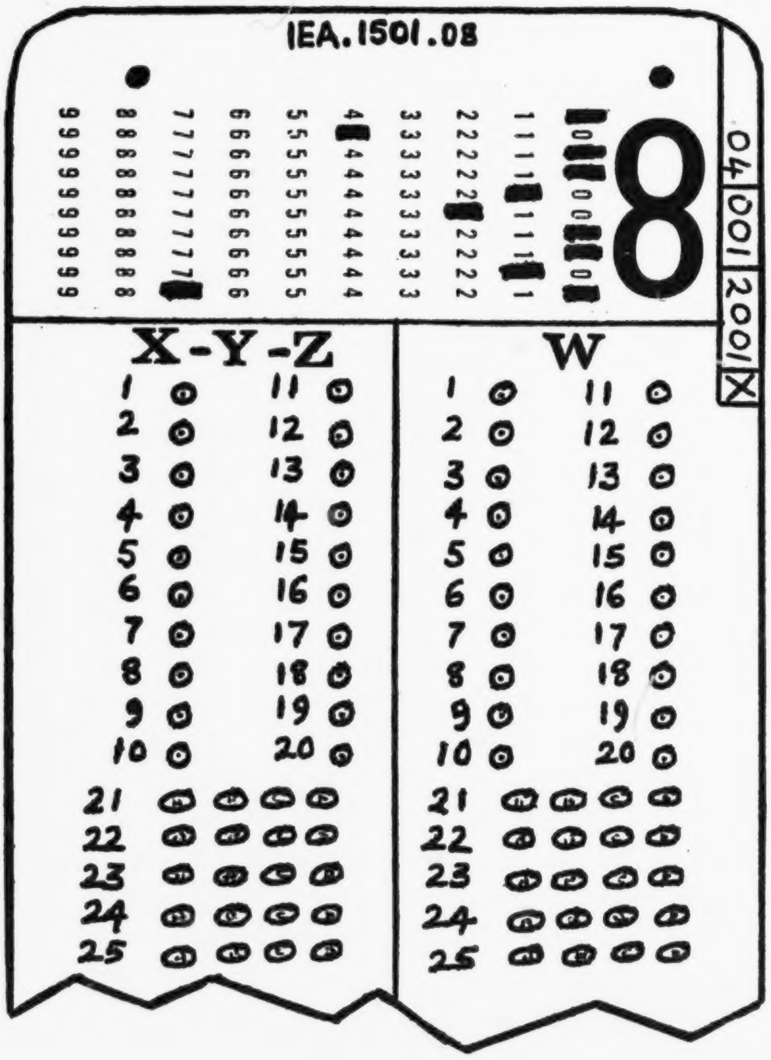
That is the end of the session.

Session 8 (50 minutes)

81. The student should be seated in the same way as before, and the test administrator should ensure that each student has his envelope on his desk in front of him.

82. Now say: -

"From your envelope take out Booklet 8 and answer card 8. The section letter on the first page of the booklet will be either an X, a Y or a Z. There are some numbers and letters printed at the top of your card by the large figure 8. The last of these will be either an X, a Y or a Z. Make sure that this letter is the same as the one on the front of your test booklet." (The test administrator should hold up a copy of Booklet 8 and answer card 8 and indicate where the two should match.)



This is the letter that should match the letter on the front of the test booklet.

If any student finds that his answer card does not match the test, then the test administrator should correct the discrepancy by giving him a correct booklet. The student should not be allowed to change answer card. When all the students are ready, say: -

> "In this booklet there is a short story. Read the story carefully and thoughtfully before going on to the questions about it. Read the questions carefully and answer them as thoughtfully and accurately as you can. The questions are preceded by instructions which you should follow. All your answers should be marked on your answer card in the Section marked X - Y - Z. You will have fifty minutes to do this test. Are there any questions?"

Answer any questions and make sure that the students know what they are to do. Then say: -

> "Turn over the page and begin."

After twenty-five minutes say: -

> "About half the time has gone. Remember do not waste time on any questions you do not know how to answer."

After forty-five minutes say: -

> "You have about five minutes more. If you have not answered Question N, which comes at the end, please do so now. If after doing this you have any time left, you may go back to any questions you have not answered."

After fifty minutes say: -

> "Stop working and put your pencils down."

Tell the students to put answer card 8 and the test booklet into the large envelope. That is the end of this session. (National Centers may wish to issue an instruction about the collection of materials at this time.)

Session 9 (50 minutes)

83. The students should be seated in the same way as before, and the test administrator should ensure that each student has his envelope on the desk in front of him.

84. Then say: -

> "Take out Test Booklet 9 and answer card 8 from the large envelope."

Make sure that students have done this correctly. Now say: -

> "This test is like the last one that you did. The answers to the questions are to be marked in Section W on the front of your answer card. You will have fifty minutes to do this test. Are there any questions?"

Answer any questions and make sure that the students know where to mark their answers. Then say: -

> "Turn over the page and begin."

After twenty-five minutes say: -

> "About half the time has gone. Remember do not waste time

on any questions you do not know how to answer."

After forty-five minutes minutes say: -

"You have about five minutes more. If you have not answered question M, which come at the end, please do so now. If after doing this you have any time left, you may go back to any questions you have not answered."

After fifty minutes say: -

"Stop working and put your pencils down."

Tell the students to put answer card 8 and test Booklet 9 into the large envelope. That is the end of this session. (National Centers may wish to issue an instruction about the collection of materials at this time.)

Session 10 (30 minutes)

85. The students should seated in the same way as before, and the test administrator should ensure that each student has his envelope on the desk in front of him.

Then say: -

"Take out Booklet 9 and answer card 8 from the large envelope. Find Section Q on the answer card. (Hold up an answer card and indicate Section Q.)

The questions in Section Q of the booklet are about you and your study of Literature. The answers to the questions in Section Q should be marked in Section Q on the answer card. Answer the questions as accurately as you can. If you have any difficulty understanding what is wanted by a particular question, please ask me. You should be able to answer all the questions in this section within fifteen minutes. Are there any questions?"

Make sure the students understand what they are to do and where to record their answers. Then say: -

"Now turn over the page and begin."

After the students have finished answering the questions in Section Q, say: -

"Turn to Section R of your test booklet. The next set of questions are also about Literature. Answer them as quickly and as accurately as you can. Mark your answers in the spaces in Section R of your answer card. You will have about fifteen minutes to complete this section. Are there any questions?

Make sure students understand what they are to do and where to record their answers. Then say: -

"Now turn over the page and begin."

After the students have completed Section R, tell them to return the answer card to the small envelope and to put the small envelope and the test booklet into the large envelope. Then tell the students to seal the large envelope.

86. National Centers who are administering National Option Tests should insert the appropriate instructions at the end of this session. Students should not be told to seal their envelopes until they have completed all tests.

87. National Centers are to enter here the instructions to the test administrator on how the envelopes are to be collected, and to the School Co-ordinator on the procedure for the return of the envelopes to the National Center.

9 January 1969

ERRATUM SHEET NO. 1 (GREEN) (Manuals)

MEMO TO NATIONAL CENTERS GIVING IVS SCIENCE TESTS

It has been suggested in discussions that some National Centers may wish to administer specialist Science tests to students who do not fall in the main Population IV sample in a school. In particular, this might be done where the numbers of specialist students would otherwise be very small. This is discussed on pages 28 and 29 of Manual 1.

However, it is very important that we do not confuse these students with the regular Population IV sample at the data processing stage. For this reason we have decided on the following procedure :

1. Students who respond to IVS Science tests but who are not in the ordinary Population IV sample shall be designated as Population V. All the data collected for these students, including the IVS test data, should bear this population number.
2. In countries where MRC answer cards are being used, a separate form IEA/A/32 should be filled in requesting answer cards for these students. The existance of this order form should be explained on the request for Population IV cards.
3. The Population V data will be stored at the International Computer Center, together with the IVS data for students in Population IV, and will probably not be used for international analysis. However, it will be possible to mak national analyses, and this data will be available for return to the National Centers afterwards.

20

IEA/M/17
17 January 1969

ERRATUM SHEET NO. 2 (GREEN)

Section (2), page 15 Manual 1

(2) The cards will arrive at the National Center in the following sequence:

(a) Teacher cards for School 001

(b) School Science card(s) for first population being tested in School 001

(c) Cards for Student 001 of first population being tested in School 001

(d) Cards for Student 002 of first population being tested in School 001, etc.

(e) School Science card(s) for second population (if any) being tested in School 001

(f) Cards for Student 001 of second population (if any) being tested in School 001

(g) Cards for Student 002 of second population (if any) being tested in School 001, etc., etc.

(h) Blank separation card (fully rectangular blue card)

(i) Teacher cards for School 002, etc., etc., etc.

N.B. (e), (f) and (g) are relevant only to those countries which testing more than one population in the same schools

Section (3), page 16, Manual 1

(3) The cards will contain ten columns of pre-punched identification code. This is interpretable as follows:

Columns 3 - 4)	(as original)
Columns 5 - 7)	
Column 8	Population code 1,2,3,4 and 5 (IVS Students who are not also members of Population IV) and, in addition, a - sign for teachers (Card 11)
Columns 9 - 11	Student code 001 - 999 (000 for School Science Cards, 101 - 999 for Teacher Cards)

.../...

Column 12 Document and Test code:

1.)
2.)
3.)
4.) (as original)
5.)
6.)
7.)
9.)

A,B,C.)
D.)
E.) School "Opportunity to learn" Science (Card 9)
J.)
K.)
L.)
P,Q,R,S,T,U.)
X,Y,Z.)
N.) National Option data (Card 10)
W.) Teachers' Questionnaire (Card 11)

The above necessitates a change to Assumption 12 on page 3 of Manual 1. Delete the sentence found on the seventh line from the bottom - "If only one population is being tested in that school, then the identification column on the MRC card (card 11) will have the appropriate population number punched." and insert "Column 8, the identification column of the target population, will be pre-punched and will be a negative sign."

INTERNATIONAL ASSOCIATION
FOR THE
EVALUATION OF EDUCATIONAL ACHIEVEMENT
(I.E.A.)

PHASE II STAGE 2

SCIENCE

December, 1968

c/o UNESCO INSTITUTE FOR EDUCATION, HAMBURG

SCIENCE TESTS

This Bulletin contains the Science test booklets. Each booklet is made up of one, two or three sections. The Science Attitude and Descriptive sections are to be found in the Questionnaire Bulletin, but where they have to be inserted into one of the Science booklets in this bulletin, this is noted in the appropriate place. At present the pages are numbered within sections, but National Centers may number within booklets if they wish to do so.

The classification and scoring keys are given at the end of the Bulletin for your information.

The Population IVS tests are national options as are the Science Practical Tests. Care should be taken when preparing the practical tests that where the student has to cut out of the booklet, no other item or drawing should be printed on the reverse side of that part of the page. (The instructions to be sent to the schools in advance about preparation of apparatus etc. for the practical tests are included just in front of the practical tests.)

Note that the instructions on how to answer the questions should be printed on the cover sheet of the first booklet only to be given to any one population. Thus in this Bulletin, the instruction cover sheet is only put on the front of Booklet 1 (for Population I) Booklet 4 (for Population II) and Booklet 10 (for Population IV).

When preparing Booklet 11B (P - U) it should be noted that six separate booklets will have to be prepared. The first 24 items are always the same but the last six are different. Thus Booklet 11B (P) will have the common 24 items and items 25 - 30 will be those from set P. Booklet 11B (Q) will have the common 24 items and then 25 - 30 from set Q etc.

The drawings which are in these booklets are not the final drawings. A special illustrator has been employed and within two weeks each National Center will receive a final drawing for each item requiring one. The Science test number and item number will be shown clearly at the side of each drawing. Where writing or letters or numbers appear on the drawing itself, these have been omitted since the National Center will have to enter these in their own language. However, once that is done, it is hoped that the drawing we have sent can be given straight to your own printer.

Finally, the International Science Committee would like to take this opportunity of thanking the National Science Committees for the very hard work which they have done in commenting on items and to the

National Centers for having carried out such a mammoth task in the pre-testing (and in some cases re-pre-testing) of so many items. Thank you very much!

If there are any queries about any matter concerning the Science tests, please contact the IEA Co-ordinator as soon as possible.

CONTENTS

Population I :

Booklet 1 : Section A IEA/1 A (pp. 1 - 7)
Section B IEA/1 B (pp. 1 - 6)
Section K * IEA/1 K (pp. 1 - 4)

Population II :

Booklet 4 : Section A IEA/4 A (pp. 1 - 17)
Section B IEA/4 B (pp. 1 - 16)

Population IV :

Booklet 10 : Section A IEA/10 A (pp. 1 - 17)

Booklet 11 : Section B (with Set P) IEA/11 B (pp. 1 - 10)
(with Set Q) (P - U) (pp. 1 - 10)
(with Set R) (pp. 1 - 10)
(with Set S) (pp. 1 - 12)
(with Set T) (pp. 1 - 11)
(with Set U) (pp. 1 - 10)

NATIONAL OPTIONS :

Population IVS :

Booklet 15 : Biology - Bio IEA/15 (pp. 1 - 14)

Booklet 16 : Chemistry - Che IEA/16 (pp. 1 - 12)

Booklet 17 : Physics - Phy IEA/17 (pp. 1 - 18)

Science Practicals :

Preparation of Schools for Science Practical (pp. 1 - 5)

Population II :

Booklet 19 : Science Practical II IEA/19 (pp. 1 - 9)

Population IV :

Booklet 20 : Science Practical IV IEA/20 (pp. 1 - 5)

Booklet 21 : Biology Practical IV IEA/21 (pp. 1 - 11)

Booklet 22 : Chemistry Practical IV IEA/22 (pp. 1 - 3)

Booklet 23 : Physics Practical IV IEA/23 (pp. 1 - 5)

Science Scoring Keys (pp. 1 - 14)

* Not included in this Bulletin.

I. E. A.

IEA/1 A
IEA/1 B
IEA/1 K

BOOKLET 1

SCIENCE

BOOKLET 1

IEA/1A
IEA/1B

SCIENCE

This test contains questions dealing with different branches of Science. Some you will know about from your school work, some from your general knowledge and others you will be able to answer by using commonsense. Others you may not be able to do. Do not waste time over questions you cannot do; leave them and go on to the next question. You can come back to questions you have missed later, if you have time. You may answer even if you are not quite sure, but do not guess blindly.

Each of the questions or unfinished statements in this test is followed by five suggested answers, lettered A,B,C,D, or E. You have to decide which one answer you think best and then on your answer card make a solid pencil mark in the oval containing the correct answer letter.

Here is an example of how to fill in the answer on your answer card. Remember that the examples given on this page are to be answered in the section marked L on your answer card.

1. How long does the earth take to travel once around the sun?

   A. A day.
   B. A week.
   C. A month.
   D. A year.
   E. None of the above.

Since the earth travels round the sun in a year, the answer space D should be marked. This has been done on the answer card for question 1 in the example section L.

Now try these three questions for practice. Fill in the space of your chosen answer on the answer card in section L.

2. Water would be turned into ice by

   A. heating it.
   B. stirring it quickly.
   C. putting salt in it.
   D. pouring it into a shallow dish.
   E. cooling it.

3. Which day of the year in the southern hemisphere has the longest period of daylight?

   A. 21st January.
   B. 21st March.
   C. 22nd December.
   D. 23rd September.
   E. 22nd June.

Sometimes you may be asked to pick out the one wrong answer or the one that does not fit in with the others.

4. Which of the following does NOT belong to the same group as the others?

   A. Eagle.
   B. Lion.
   C. Mouse.
   D. Elephant.
   E. Deer.

DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO.

SECTION A

1. The sun is the only object in our solar system that gives off large amounts of light and heat. We see the moon because it is

   A. reflecting light from the sun.
   B. white hot.
   C. a star.
   D. the biggest object in the solar system.
   E. nearer the earth than the sun.

2. Imagine yourself leaving a rocket ship on the surface of the moon. You would

   A. be overcome with molten lava.
   B. weigh less.
   C. be poisoned by the atmosphere.
   D. shoot off into space.
   E. burn to death with the heat of the sun.

Questions 3 - 6 refer to the following chart which shows some readings made at different times on three days.

	6.0 a.m.	9.0 a.m.	12.0 Noon	3.0 p.m.	6.0 p.m.
Monday	15° C	17° C	20° C	21° C	19° C
Tuesday	15° C	15° C	15° C	10° C	9° C
Wednesday	8° C	10° C	14° C	14° C	13° C

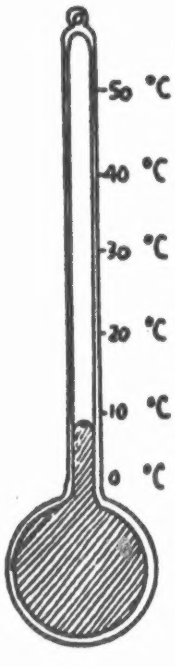
3. To obtain these readings it was necessary to have a

   A. ruler and a thermometer.
   B. barometer and a thermostat.
   C. thermostat and a clock.
   D. thermometer and a barometer.
   E. thermometer and a clock.

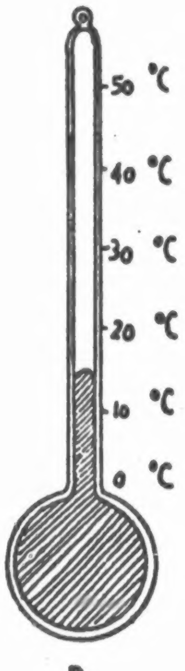
4. When was the highest temperature recorded?

   A. Noon on Monday.
   B. 3.0 p.m. on Monday.
   C. Noon on Tuesday.
   D. Noon on Wednesday.
   E. 6.0 p.m. on Wednesday.

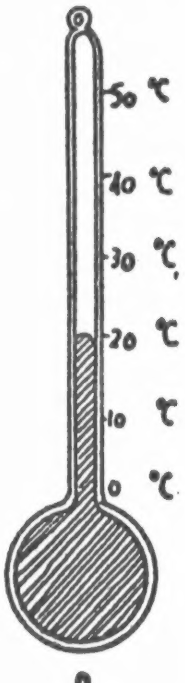
5. **Which of the following instruments gives the temperature at 6.0 a.m. on Wednesday?**


50 °C
40 °C
30 °C
20 °C
10 °C
0 °C

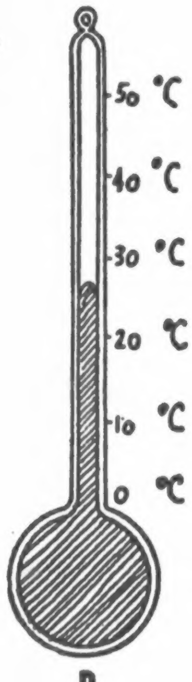
A


50 °C
40 °C
30 °C
20 °C
10 °C
0 °C

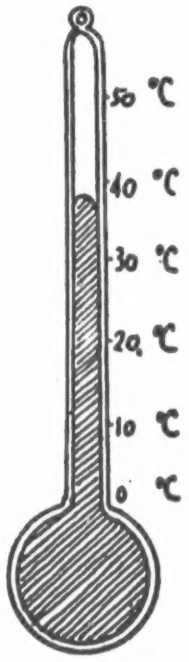
B


50 °C
40 °C
30 °C
20 °C
10 °C
0 °C

C


50 °C
40 °C
30 °C
20 °C
10 °C
0 °C

D


50 °C
40 °C
30 °C
20 °C
10 °C
0 °C

E

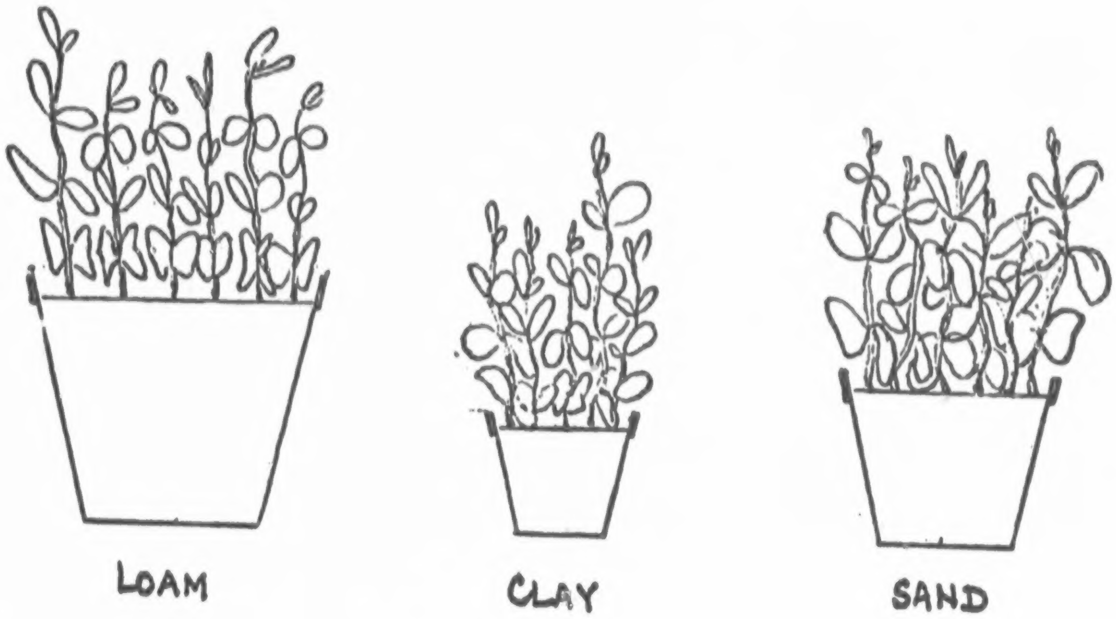
6. **On one day a cool wind began to blow. When do you think this happened?**

A. Monday morning.
B. Monday afternoon.
C. Tuesday morning.
D. Tuesday afternoon.
E. Wednesday afternoon.

7. Which of the following statements is true about seeds?

   A. All plants produce seeds.
   B. All fruits contain a large number of seeds.
   C. All seeds are good to eat.
   D. Every seed contains a young plant, stored food and a seed coat.
   E. The food stored in seeds is always in the cotyledon.

8. Tom wanted to learn which of three types of soil - clay, sand or loam - would be best for growing beans. As shown in the drawing, he found three flowerpots, put a different type of soil in each pot, and planted the same number of beans in each. He placed them side by side on the window sill and gave each pot the same amount of water.



Why do you think that Tom's experiment was NOT a good one?

   A. The plants in one pot got more sunlight than the plants in the other pots.
   B. The amount of soil in each pot was not the same.
   C. One pot should have been placed in the dark.
   D. Tom should have used three kinds of seeds.
   E. It would get too hot on the window sill.

9. John put some seeds on moist cotton wool in a dish. Jane put some into a glass full of water by the side of his. After two days John's seeds sprouted but nothing seemed to happen to Jane's. Which of the following is the most probable explanation?

   A. Jane's seeds had been kept dry for too long.
   B. Jane did not allow her seeds enough air.
   C. Jane did not put the glass in a warm enough place.
   D. Jane should have used a different kind of seed.
   E. Jane did not use any cotton wool.

10. John's pet rabbit was injured by a car and became lame. Some months after the accident she produced a litter. Which of the following describes what the babies would probably be like?

   A. All of them would be lame because the mother was.
   B. Most of them would be lame but not all of them because the father was not lame.
   C. Most of them would not be lame because the father was not lame.
   D. None of them would be lame because the mother's lameness was due to an accident.
   E. Only one of them would be lame because the mother was lame.

11. A certain wild bird has webbed feet. In which of the following places would you be most likely to find it?

   A. A forest.
   B. A meadow.
   C. A cornfield.
   D. A desert.
   E. A lake.

12. Paint stops the rusting of iron by

   A. preventing nitrogen from coming in contact with the iron.
   B. reacting chemically with the iron.
   C. preventing oxygen and moisture from coming in contact with the iron.
   D. preventing carbon dioxide from coming in contact with the iron.
   E. making the surface of the iron smoother.

13. Which one of the following is often used for making the metal containers in which food is preserved and sold?

   A. Tin with a thin coating of steel.
   B. Steel.
   C. Nickel.
   D. Copper.
   E. Steel with a thin coating on it.

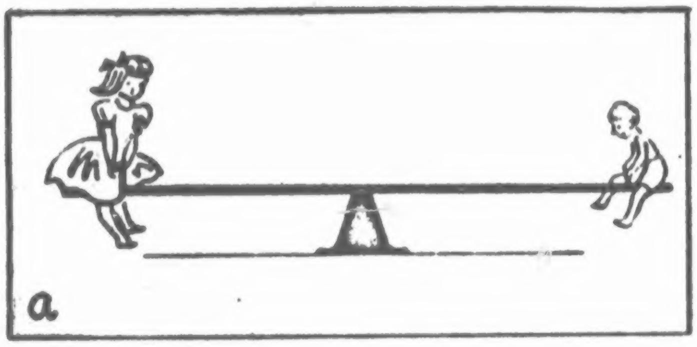
14. **Mary and Jane each bought the same kind of rubber ball. Mary said, "My ball bounces higher than yours." Jane replied, "I'd like to see you prove that." What should Mary do?**

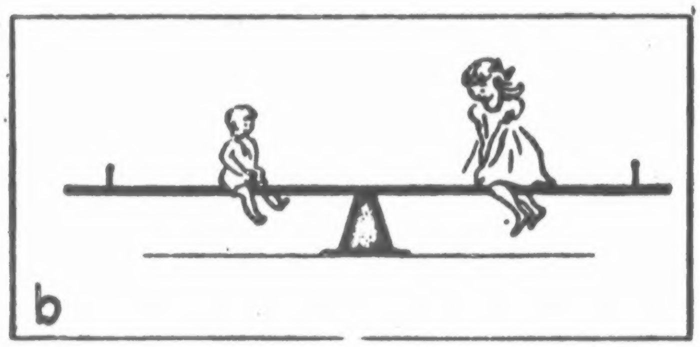
- **A. Drop both balls from the same height and notice which bounces higher.**
- **B. Throw both balls against a wall and see how far each ball bounces off the wall.**
- **C. Drop each ball from a different height and notice which bounces higher.**
- **D. Throw the balls down against the floor and see how high they bounce.**
- **E. Feel the balls by hand to find which is the harder.**

15. **In order to open a can of tomato juice Betty punched two holes. Why do you think she did this? To**

- **A. let the juice pour out of the can more slowly.**
- **B. let the air go into one hole while the juice poured out of the other.**
- **C. let the air get into the can before the juice was poured.**
- **D. let the juice pour out of the can more quietly.**
- **E. watch how the juice was pouring out.**

16. **Betty wanted to seesaw with her little brother, George. Which picture shows the best way for Betty, who weighed 100 pounds, to balance George, who weighed 50 pounds?**


a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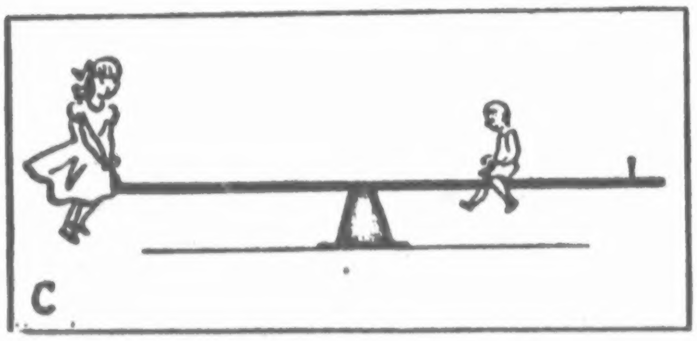
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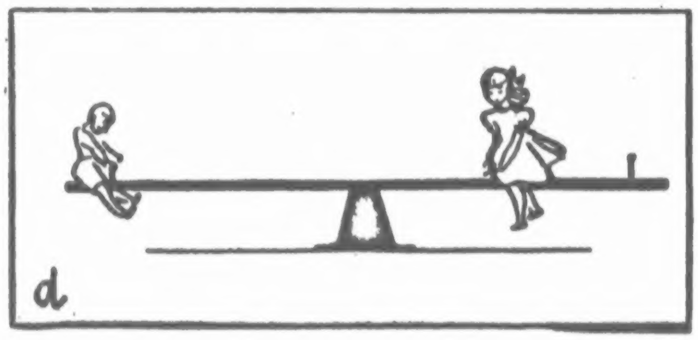

d

A. Picture a
B. Picture b
C. Picture c
D. Picture d
E. None of these

SECTION B

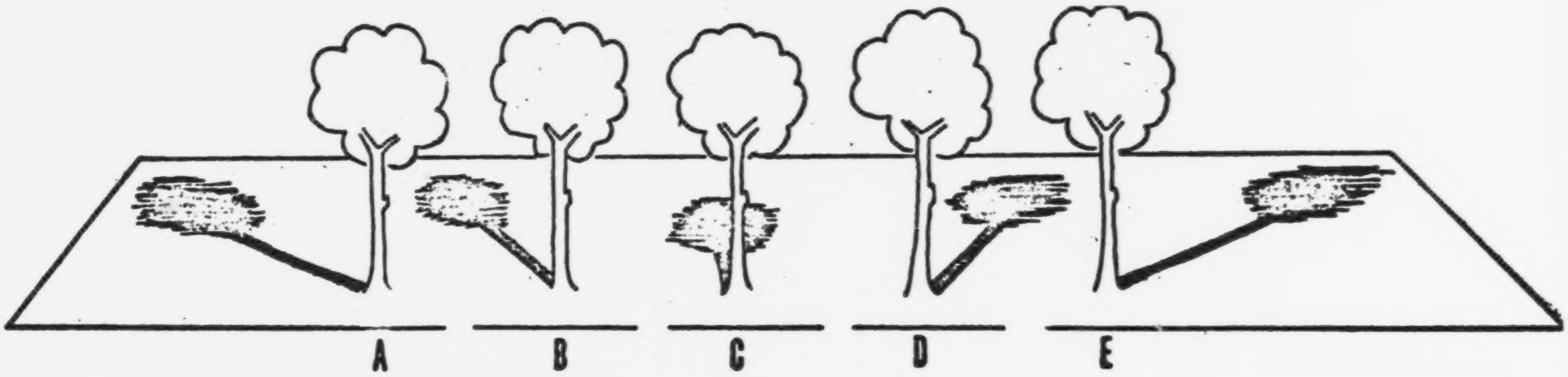
1. Let us imagine you are taking a trip to the moon in a rocket ship. As the rocket ship approaches close to the moon, you would be travelling through

   A. air.
   B. clouds.
   C. gas.
   D. space without air.
   E. time.

2. About how long would it take a rocket ship to reach the moon?

   A. Two hours.
   B. Several hours.
   C. A few days.
   D. A light-year.
   E. Several years.

3. At different times during a sunny day a tree was seen to have cast a shadow of different length as shown in the diagrams below. Which diagram shows the shadow at mid-day (12.00 hours)?



4. The reason that milk kept in a refrigerator does not go sour is that the cold

   A. changes the water of the milk into ice.
   B. separates the cream.
   C. slows down the action of bacteria.
   D. keeps flies away.
   E. causes a skin to form on the surface.

5. Which one of the following plants is NOT grown for food?

   A. Wheat.
   B. Rice.
   C. Potato.
   D. Sugar cane.
   E. Cotton.

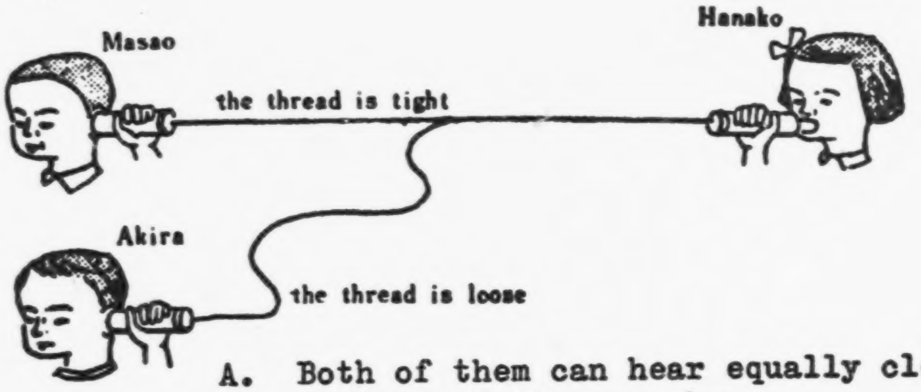
17. Tony was using his hand pump to put more air in the tyre. After a while he found that it became harder to use the pump. This was because the

A. air in the tyre pushed against the pump.
B. air started to leak out of the pump.
C. pump got too hot to hold.
D. pump got too sticky to push.
E. tyre is bigger than the pump.

18. When water is boiling it

A. changes colour.
B. loses heat.
C. changes to steam.
D. gets hotter.
E. stops bubbling.

19. The picture shows Masao and his friends playing with a thread-telephone. Hanako is speaking. Masao and Akira are trying to listen. Which of them can hear her speak?



A. Both of them can hear equally clearly.
B. Neither of them can hear.
C. Akira alone can hear clearly.
D. Masao alone can hear clearly.
E. Both of them hear equally faintly.

20. Harry wondered if sound is able to travel through water. To find out by an experiment which of the following should he do?

A. Ask his teacher or parents.
B. Hit two stones together above the water of the lake and listen to the sound.
C. Put his ear next to the water of the lake and hit two stones together above the water.
D. Put his head under the water of the lake and hit two stones together in the water.
E. Drop a stone into the water and listen for the splash.

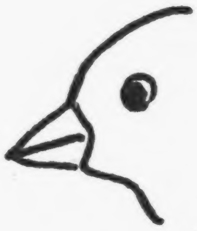
END OF SECTION A

DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO

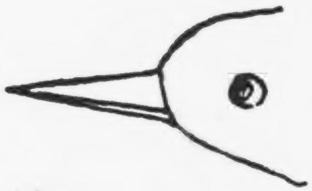
6. John brought the skull of a dead animal to school. His teacher said she did not know what the animal was but she was sure that it was one that preyed on other animals for its food. Which clue, do you think, led her to this conclusion?

   A. The eye sockets pointed sideways.
   B. The skull was much longer than it was wide.
   C. There was a projecting ridge along the top of the skull.
   D. Four of the teeth were long and pointed.
   E. The jaws could work sideways as well as up and down.

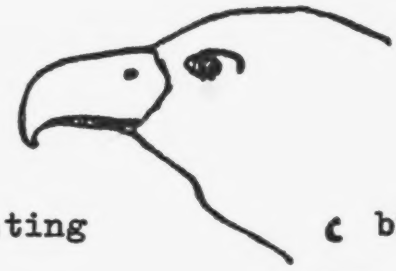
7. While Joe was sitting under a tree, he watched a bird getting insects from between the cracks of the bark. Which drawing shows the kind of beak this bird had?



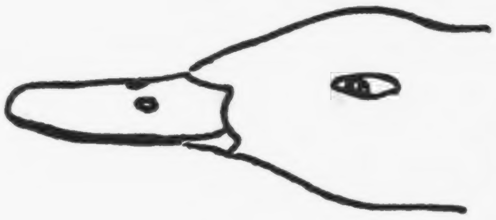
A seed eating bird e.g. sparrow



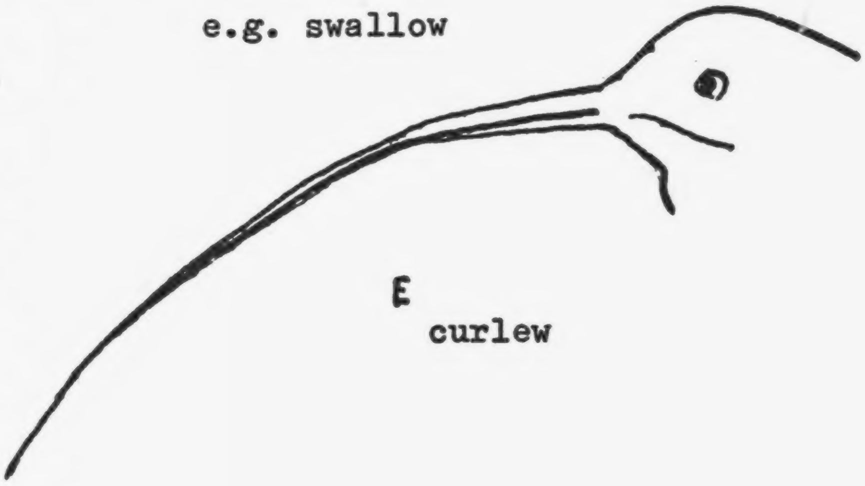
B insect eating bird e.g. swallow



C bird of prey



D duck



E curlew

8. If, immediately before and after a 50 metre race, your pulse and breathing rates were taken, you would expect to find

   A. no change in pulse but decrease in breathing rate.
   B. an increase in pulse but no change in breathing rate.
   C. an increase in pulse and breathing rate.
   D. a decrease in pulse and breathing rate.
   E. no change in either.

9. Flowers cannot usually produce seeds unless

   A. they are visited by insects.
   B. they appear in the summer.
   C. pollen from another flower reaches them.
   D. they produce nectar.
   E. suitable pollen is placed on their stigmas.

10. Some seeds germinate best in the dark, others in the light, while others germinate equally well in the dark or the light. If you wanted to find out by means of an experiment to which group a certain kind of seed belonged, you would sow some of the seeds on damp blotting paper and

   A. keep them in a warm place in the dark.
   B. keep one batch in the light and another in the dark.
   C. keep them in a warm place in the light.
   D. sow some on dry blotting paper and keep them in the light.
   E. sow some on dry blotting paper and keep them in the dark.

11. Which one of the following animals does not usually live in the kind of place shown?

   A. Zebras on grassy plains.
   B. Seals on rocky sea shores.
   C. Beavers on river banks.
   D. Monkeys in forests.
   E. Moles in rocky places.

12. John gave some reasons why kettles and kitchen pans are often made of copper. Which of his reasons was wrong?

   A. Copper is a bad conductor of heat.
   B. Copper is a tough metal.
   C. Copper can be polished to give a pleasing finish.
   D. Copper is easy to shape.
   E. Copper does not dissolve in hot water.

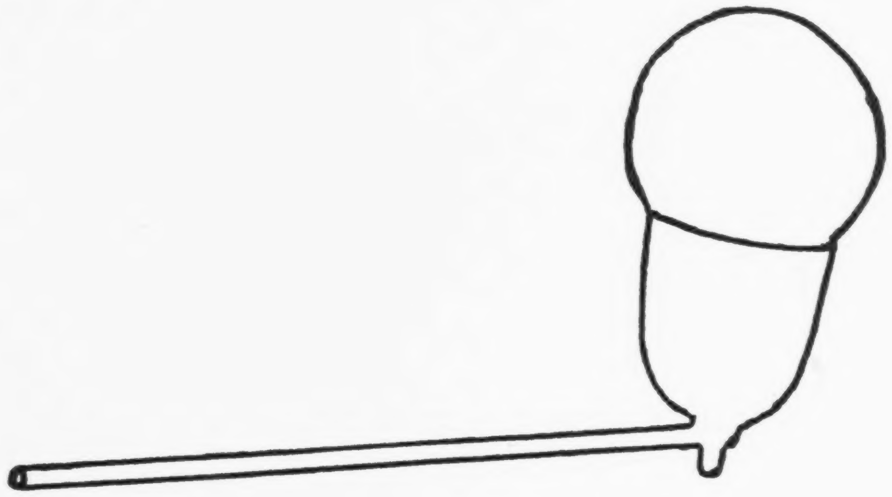
13. What gas in the air is essential for us to breathe in order to live?

   A. Nitrogen
   B. Oxygen.
   C. Carbon dioxide.
   D. Hydrogen.
   E. Water vapour.

14. When Tom threw his rubber ball into the air, it came back to the ground because

A. the air pushed it back.
B. rubber always bounces back.
C. the earth pulled it back.
D. the air is very light.
E. the earth is a large magnet.

15. Ann was playing with a bubble pipe. When the bubble was the size of the one in the picture, she took the pipe out of her mouth. What do you think happened to the bubble after that?



A. It got larger for a time and then stayed at this size.
B. It got smaller for a time and then stayed at this size.
C. It got smaller and smaller and disappeared into the pipe.
D. It stayed on the pipe without getting larger or smaller.
E. It became larger and larger until it burst.

16. Some children had made a space-ship from wooden boxes. Today they are making plans for their first trip to the moon. Judy says, "Scientists tell us that the moon has no atmosphere." Jack asks, "How can we keep in touch with each other?" Which one of the children's ideas is best?

A. Judy says, "Let's take a garden hose to use as a speaking tube."
B. Phil says, "Let's find out from Mr. Jones where he got his hearing aid. We could take some of those."
C. Joe says, "Let's make sure we take enough walkie-talkies with plenty of fresh batteries."
D. Betty says, "Let's bring along some large megaphones like the cheerleaders use."
E. John says, "Our voices would carry better on the moon and there would be no problem."

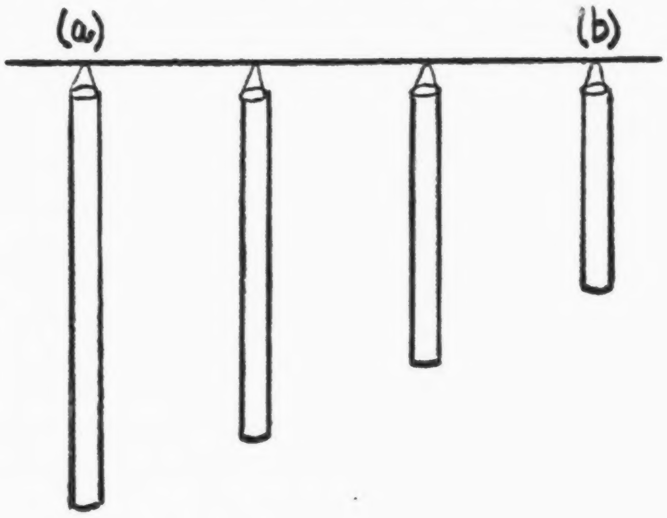
17. Betty was trying to take the metal screw-top off a jar of jam but it wouldn't turn. What should Betty do in order to open the jar with the least risk of breaking it?

- A. Force the cap off with a screw driver.
- B. Run hot water on the glass part of the jar.
- C. Run cold water on the cap.
- D. Hammer the cap off.
- E. Run hot water on the cap.

18. As part of an investigation a cupful of water and a similar cupful of petrol were placed on a window sill on a hot sunny day. A few hours later it was observed that both the cups had less liquid in them and that there was less petrol left than water. The experiment showed that

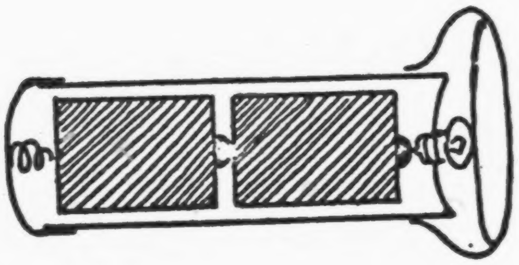
- A. all liquids evaporate.
- B. petrol gets hotter than water.
- C. some liquids evaporate faster than others.
- D. liquids will only evaporate in sunshine.
- E. water gets hotter than petrol.

19. Some boys made a set of chimes by cutting four pieces of pipe of different lengths from a long metal pipe and hanging them as shown in the picture below. Which of the pipes gave the lowest note when they struck it with a hammer?

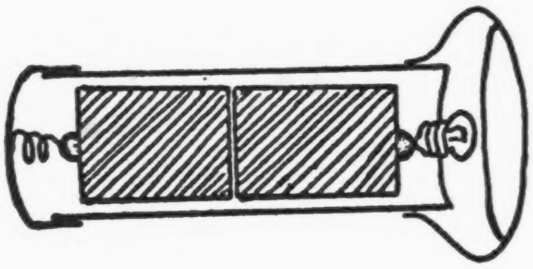


- A. Pipe (a)
- B. Pipe (b)
- C. All gave the same note.
- D. You cannot tell without trying.
- E. It depends on where you hit it.

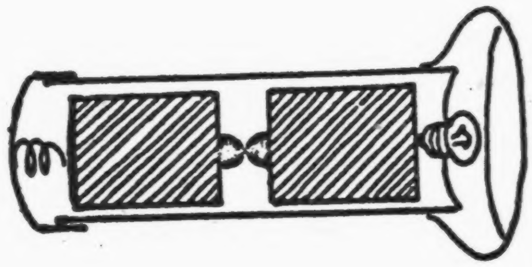
20. A flashlight holds two cells. In order to make it work, in which of the following ways must we place the cells?



A



B



C

A. As in (a)
B. As in (b)
C. As in (c)
D. Either as in (b) or (c)
E. None of these would do.

END OF SECTION B

DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO

SECTION K

Section K should be entered here. It is to be found in the Questionnaire Bulletin.

At the end of the Section, please print :

END OF BOOKLET 1

I. E. A.

IEA/4 A
IEA/4 B

BOOKLET 4

SCIENCE

BOOKLET 4

IEA/4A
IEA/4B

SCIENCE

This test contains questions dealing with different branches of Science. Some you will know about from your school work, some from your general knowledge and others you will be able to answer by using commonsense. Others you may not be able to do. Do not waste time over questions you cannot do; leave them and go on to the next question. You can come back to questions you have missed later, if you have time. You may answer even if you are not quite sure, but do not guess blindly.

Each of the questions or unfinished statements in this test is followed by five suggested answers, lettered A,B,C,D, and E. You have to decide which one answer you think best and then on your answer card make a solid pencil mark in the oval containing the correct answer letter.

Here is an example of how to fill in the answer on your answer card. Remember that the examples given on this page are to be answered in the section marked L on your answer card.

1. How long does the earth take to travel once around the sun?

   A. A day.
   B. A week.
   C. A month.
   D. A year.
   E. None of the above.

Since the earth travels round the sun in a year, the answer space D should be marked. This has been done on the answer card for the question 1 in the example section L.

Now try these three questions for practice. Fill in the space of your chosen answer on the answer card in section L.

2. Water would be turned into ice by

   A. heating it.
   B. stirring it quickly.
   C. putting salt in it.
   D. pouring it into a shallow dish.
   E. cooling it.

3. Which day of the year in the southern hemisphere has the longest period of daylight?

   A. 21st January.
   B. 21st March.
   C. 22nd December.
   D. 23rd September.
   E. 22nd June.

Sometimes you may be asked to pick out the one wrong answer or the one that does not fit in with the others.

4. Which of the following does NOT belong to the same group as the others?

   A. Eagle.
   B. Lion.
   C. Mouse.
   D. Elephant.
   E. Deer.

DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO.

1. About how long would it take a rocket ship to reach the moon?

   A. Two hours.
   B. Several hours.
   C. A few days.
   D. A light-year.
   E. Several years.

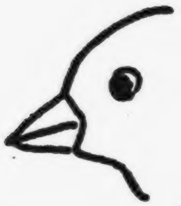
2. Which of the following statements is true about seeds?

   A. All plants produce seeds.
   B. All fruits contain a large number of seeds.
   C. All seeds are good to eat.
   D. Every seed contains a young plant,stored food and a seed coat.
   E. The food stored in seeds is always in the cotyledon.

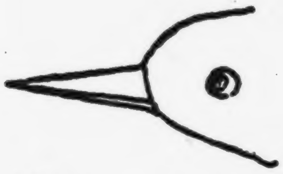
3. Which of these substances is found in every living cell?

   A. Protein.
   B. Chlorophyll.
   C. Cellulose.
   D. Starch.
   E. Haemoglobin.

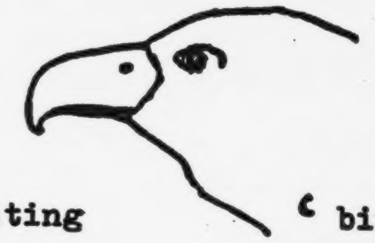
4. While Joe was sitting under a tree, he watched a bird getting insects from between the cracks of the bark. Which drawing shows the kind of beak this bird had?



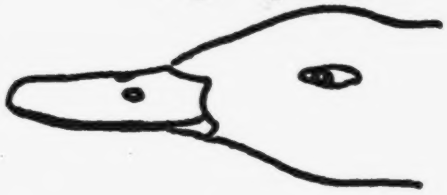
A seed eating bird e.g. sparrow



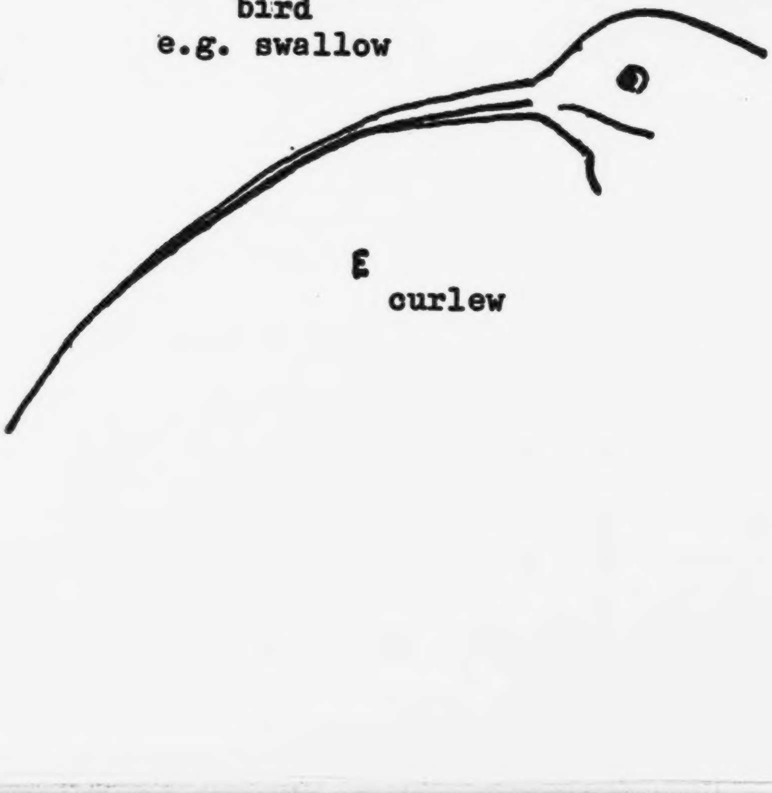
B insect eating bird e.g. swallow



C bird of prey



D duck



E curlew

5. One of the following lists of small invertebrate animals contains only insects. Which one is it?

A. Houseflies, Spiders, Mosquitoes, Woodlice.
B. Millipedes, Butterflies, Houseflies, Mosquitoes.
C. Butterflies, Ants, Cockroaches, Houseflies.
D. Cockroaches, Butterflies, Spiders, Mosquitoes.
E. Ants, Moths, Beetles, Centipedes.

6. Which of the following organs is NOT situated in the abdomen?

A. Liver.
B. Kidney.
C. Stomach.
D. Bladder.
E. Heart.

7. The serving of reheated meat in restaurants is often discouraged and sometimes prohibited by law. Which of the following is the main reason for this?

A. Most people do not like it.
B. Valuable mineral salts are lost on reheating.
C. It is uneconomic to heat food twice.
D. Bacteria will multiply more quickly on warm meat.
E. Reheating causes a reduction in protein content.

8. Tissue from a cow is shown on analysis to contain protein, a small amount of fat, some iron, and large quantities of vitamins A and D. Which part of the body did it come from?

A. Muscles.
B. Kidney.
C. Liver.
D. Heart.
E. Brain.

9. Which of the following experimental procedures would serve best to determine the effectiveness of inoculating children against measles?

A. Take 50 children who have never had measles and expose them to the disease and then inoculate all of them.
B. Inoculate 25 of 50 children who have never had measles and then expose all 50 of them to the disease.
C. Inoculate 50 children who have not had measles and then expose all of them to the disease.
D. Take a random sample of 50 children, inoculate 25 of them and then expose all 50 of them to the disease.
E. Take a random sample of 50 children, inoculate all of them and then expose 25 of them to the disease.

10. Why is it that your body temperature does not fall even though you lose heat continually?

    A. The blood distributes heat round the body.
    B. Respiration results in the liberation of heat.
    C. Heat is constantly being absorbed from the sun.
    D. Hot meals are eaten regularly.
    E. Warm clothes are good insulators.

11. John put some seeds on moist cotton wool in a dish. Jane put some into a glass full of water by the side of his. After two days John's seeds sprouted but nothing seemed to happen to Jane's. Which of the following is the most probable explanation?

    A. Jane's seeds had been kept dry for too long.
    B. Jane did not allow her seeds enough air.
    C. Jane did not put the glass in a warm enough place.
    D. Jane should have used a different kind of seed.
    E. Jane did not use any cotton wool.

12. When alcohol is burned in air, water is formed. Another product of the combustion is a gas which turns lime water cloudy. Consider the following three statements with regard to these two facts

    Statements.
    I. Carbon is a constituent element of alcohol.
    II. Hydrogen is a constituent element of alcohol.
    III. Oxygen is a constituent element of alcohol.

    Which statement or combination of these statements can be deduced from the evidence given?

    A. I and II.
    B. I, II and III.
    C. I and III.
    D. II and III.
    E. I only.

13. When 2 g of zinc and 1 g of sulphur are heated together, practically no zinc or sulphur remains after the compound zinc sulphide is formed. What happens if 2 g zinc are heated with 2 g of sulphur?

    A. Zinc sulphide containing approximately twice as much sulphur is formed.
    B. Approximately 1 g of sulphur will be left over.
    C. Approximately 1 g of zinc will be left over.
    D. Approximately 1 g of each will be left over.
    E. No reaction will occur.

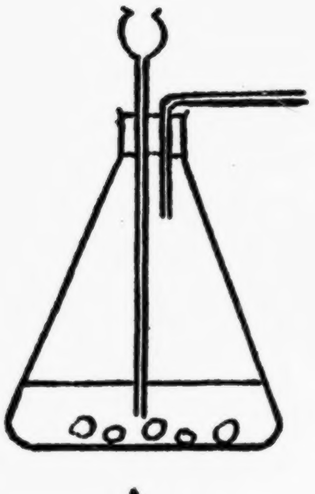
14. Heating a mixture of powdered iron and sulphur will result in the formation of

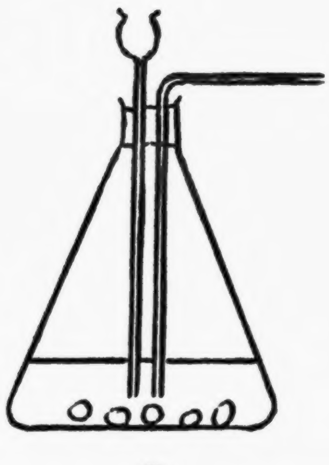
A. a single element.
B. two other elements.
C. a solution.
D. an alloy.
E. a compound.

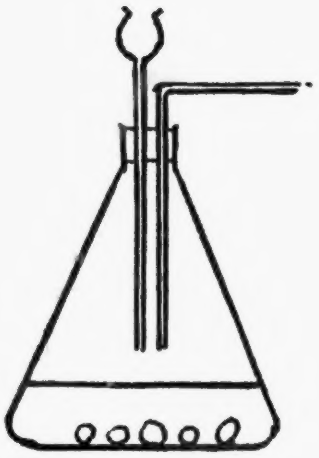
15. A solution of substance X was added to a solution of substance Y. It was thought that a chemical reaction had taken place although there was no visible evidence. Which of the following would provide evidence that a chemical reaction had taken place?

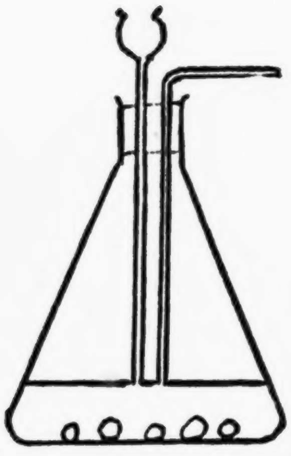
A. Noting that the product is soluble in water.
B. Showing that X and Y can be mixed in all proportions.
C. Noting that there is a rise of temperature when the two solutions are mixed.
D. Showing that the final liquid is neutral by using an indicator.
E. Changing the concentration of the solutions and repeating the experiment.

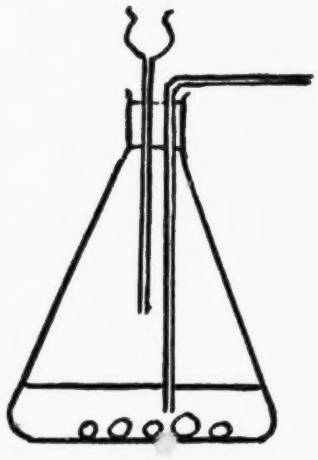
16. Which of the following is the best arrangement of apparatus for collecting a gas produced by the action of a liquid on a solid?


A


B


C


D


E

17. By using your knowledge of the activity series which of the following methods would you employ in order to obtain copper from copper oxide?

A. Heat copper oxide with silver.
B. Pass hydrogen through copper oxide suspended in cold water.
C. Pass hydrogen over hot copper oxide.
D. Heat copper oxide with dilute hydrochloric acid.
E. Pass steam over hot copper oxide.

18. We can explain chemical changes in terms of the gain or loss or sharing of

A. electrons furthest from the nucleus of the atom.
B. electrons closer to the nucleus of the atom.
C. electrons from the nucleus of the atom.
D. protons from the nucleus of the atom.
E. neutrons from the nucleus of the atom.

Items 19 and 20 refer to the following table.

Substance	Electrical Conductivity	Melting Point	Boiling Point	Effect of Heating in Air
P	Good when solid or liquid	97°C	889°C	Burns to form a single oxide which forms an alkaline solution in water.
Q	Nonconductor	113°C	444°C	Burns to form a single oxide which forms an acidic solution in water.
R	Nonconductor	5°C	80°C	Burns to form carbon dioxide and water.
S	Nonconductor when solid, good conductor when molten	800°C	1413°C	Melts; no new substance formed.

19. Which substance could be a metallic element?

A. Substance P.
B. Substance Q.
C. Substance R.
D. Substance S.
E. None of these.

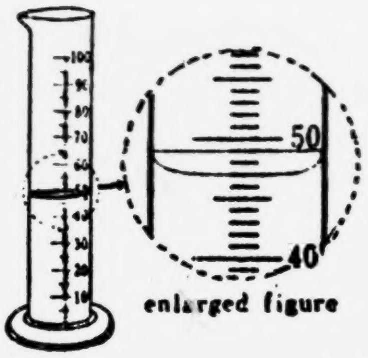
20. Which substance when heated in air would not change in weight?

A. Substance P.
B. Substance Q.
C. Substance R.
D. Substance S.
E. None of these.

21. Mary and Jane each bought the same kind of rubber ball. Mary said, "My ball bounces higher than yours." Jane replied, "I'd like to see you prove that." What should Mary do?

A. Drop both balls from the same height and notice which bounces higher.
B. Throw both balls against a wall and see how far each ball bounces off the wall.
C. Drop each ball from a different height and notice which bounces higher.
D. Throw the balls down against the floor and see how high they bounce.
E. Feel the balls by hand to find which is the harder.

22. The measuring cylinder contains a certain volume of water. The enlarged figure shows a view of the surface of the water as seen from the side. What is the volume of the water ?

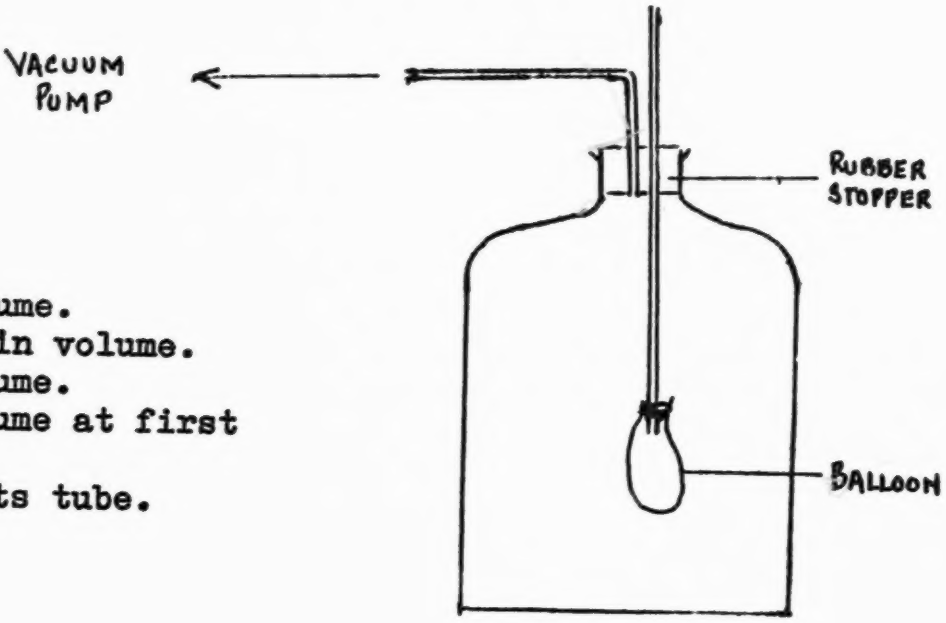


A. $50\ cm^3$
B. $49\ cm^3$
C. $48\ cm^3$
D. $47\ cm^3$
E. $46\ cm^3$

23. A man should be able to jump higher on the Moon than on the Earth mainly because

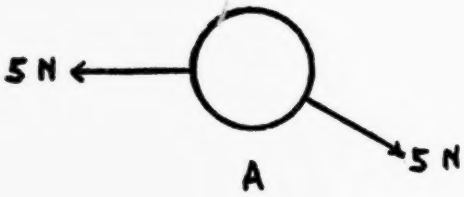
A. his mass is less.
B. the Moon's mass is less than the Earth's.
C. his distance from the Earth is greater.
D. there is no air.
E. Newton's Laws of Motion do not apply.

24. What happens to the balloon when the air in the bottle is extracted by a vacuum pump?

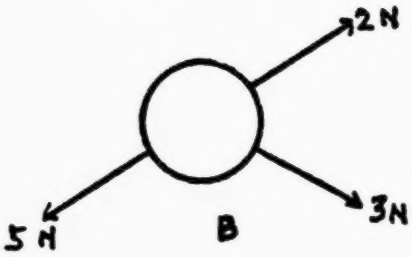

VACUUM
PUMP
RUBBER
STOPPER
BALLOON

A. It increases in volume.
B. It does not change in volume.
C. It decreases in volume.
D. It decreases in volume at first but then increases.
E. It is sucked into its tube.

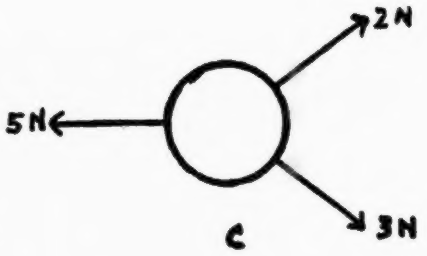
25. The diagrams show rings being pulled by different forces in the same plane. Which ring is in equilibrium under the action of the given forces?



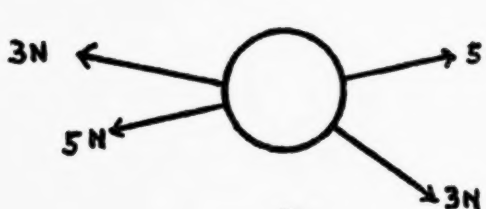
A



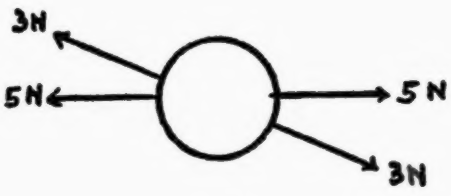
B



C

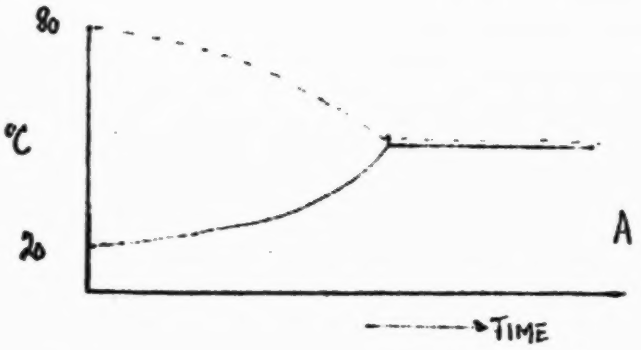


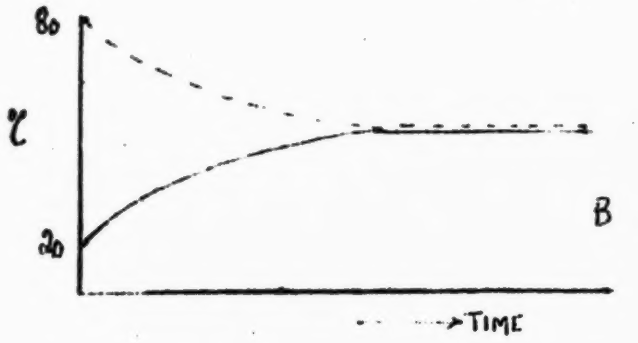
D

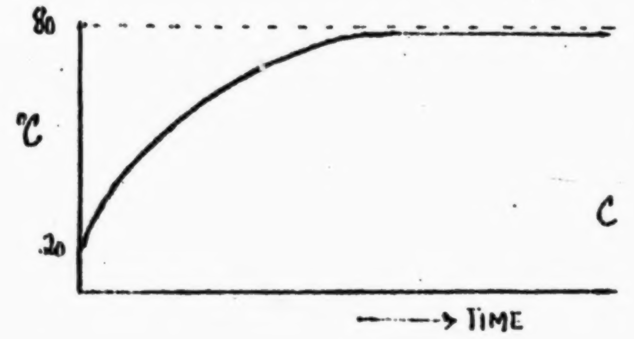


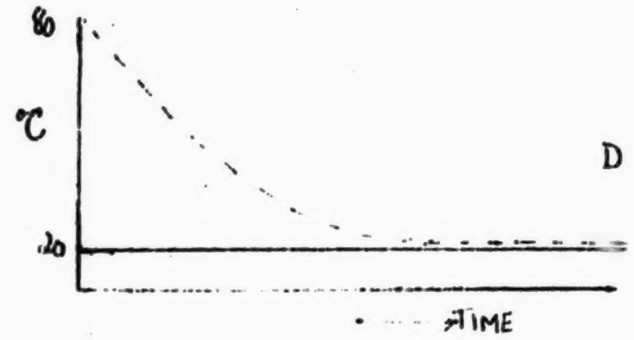
E

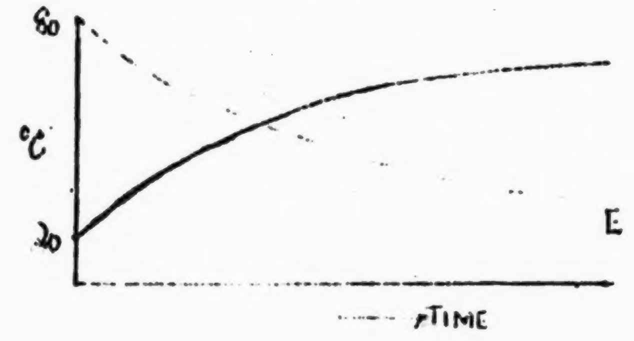
26. After 100 g of water at 20° C was poured into the container P, 100 g of water at 80° C was poured into the beaker Q. The temperatures of the water in the two vessels were measured after equal intervals of time. Which of the following graphs best represents the changes in the temperatures of the water in the two vessels?

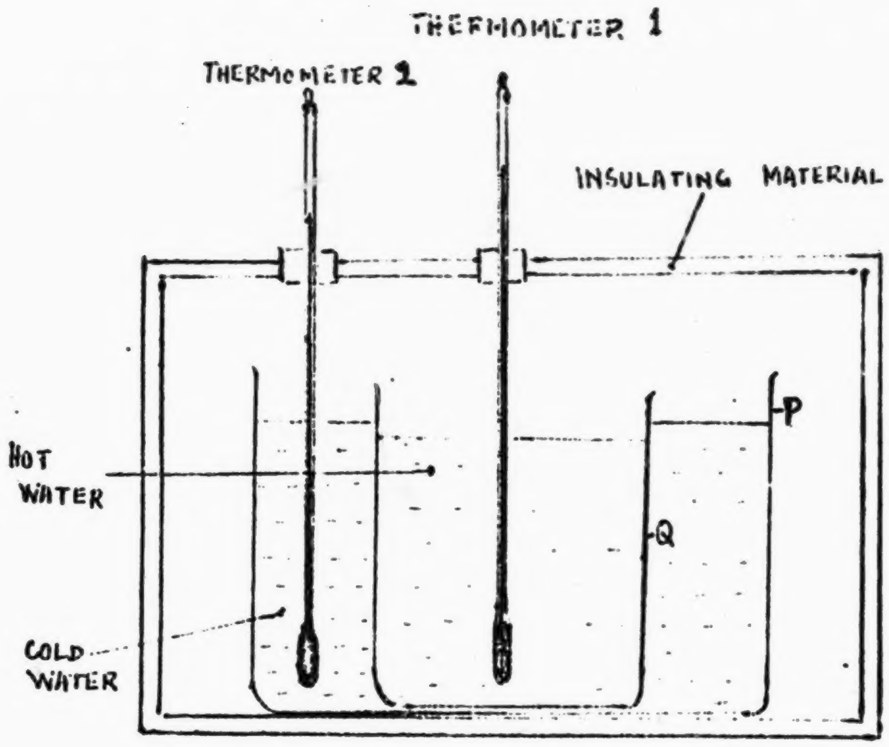











THERMOMETER 1
THERMOMETER 2
INSULATING MATERIAL
P
HOT WATER
Q
COLD WATER

- - - - - - - - - - THERMOMETER 1

———————— THERMOMETER 2

27. Under what conditions does water evaporate fastest?

A. On a hot and dry day.
B. On a hot and moist day.
C. On a cold and dry day.
D. On a cold and moist day.
E. The rate of evaporation is independent of the conditions of temperature and humidity.

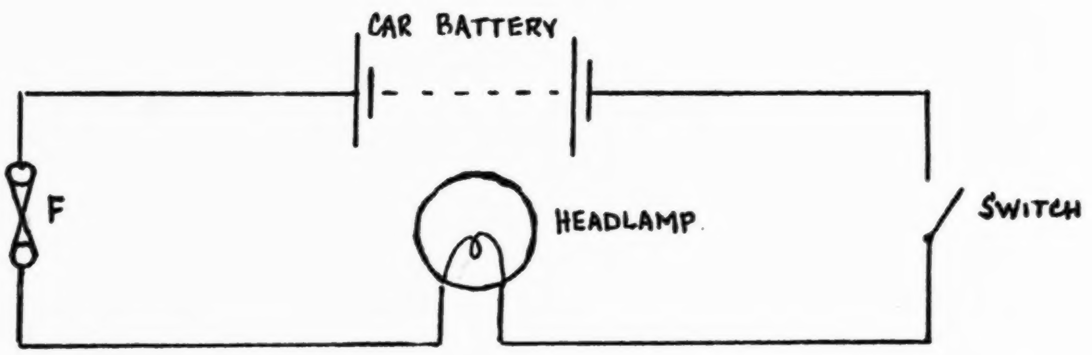
28. The crews of ships at sea can communicate by shouting through loudhailers. It is impossible for the crews of spaceships in space to do this because

A. the temperature is too low.
B. the sound is reflected.
C. the pressure is too high inside the space ship.
D. the sound barrier has been broken.
E. there is no air.

29. Jane was trying to find out which things she could pick up with a magnet. With which one of the following would she NOT succeed?

A. A compass needle.
B. A steel screw.
C. An iron nail.
D. A sewing needle.
E. A brass paper fastener.

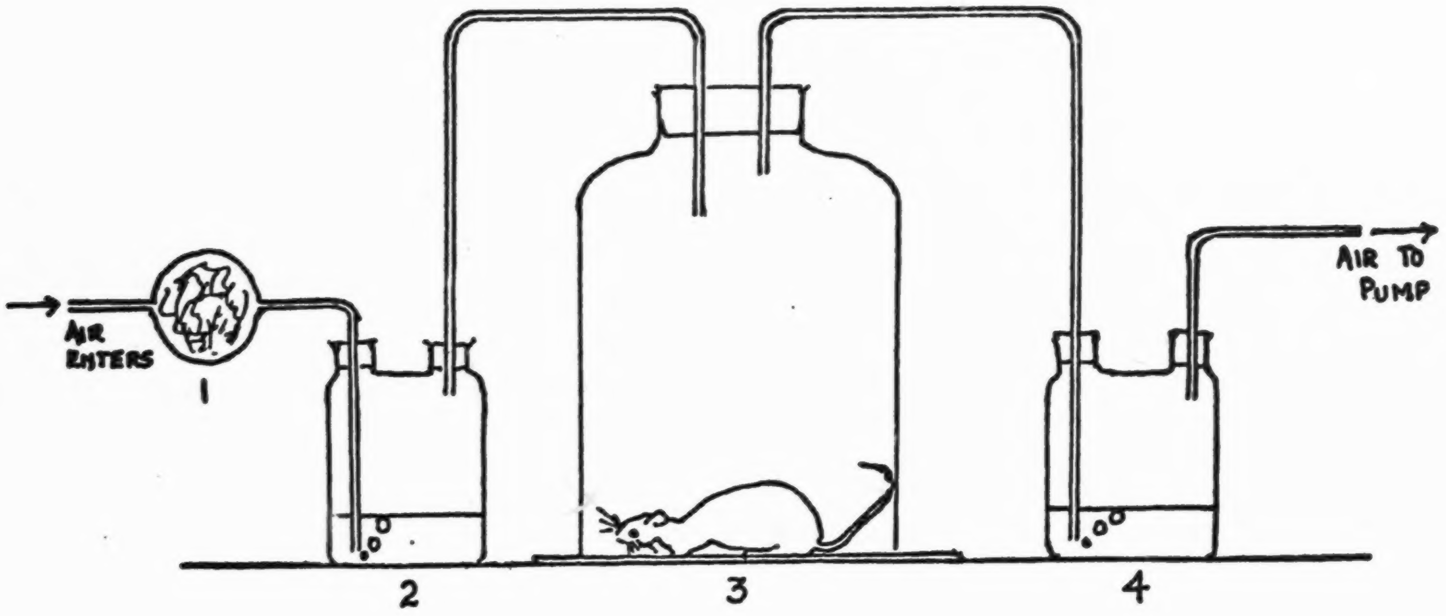
30. The following diagram shows a lighting circuit in a car.



Fuse F would most probably be made of

A. thin wire with low melting point.
B. thick wire with low melting point.
C. thick wire with high melting point.
D. thin wire with high melting point.
E. the same wire as the connecting leads.

Questions 31 and 32 refer to the following diagram which shows an arrangement of apparatus which can be used to show that an animal gives out carbon dioxide in respiration.



1 contains a substance which removes carbon dioxide from air, 2 and 4 both contain a liquid which changes in appearance when carbon dioxide passes through it.

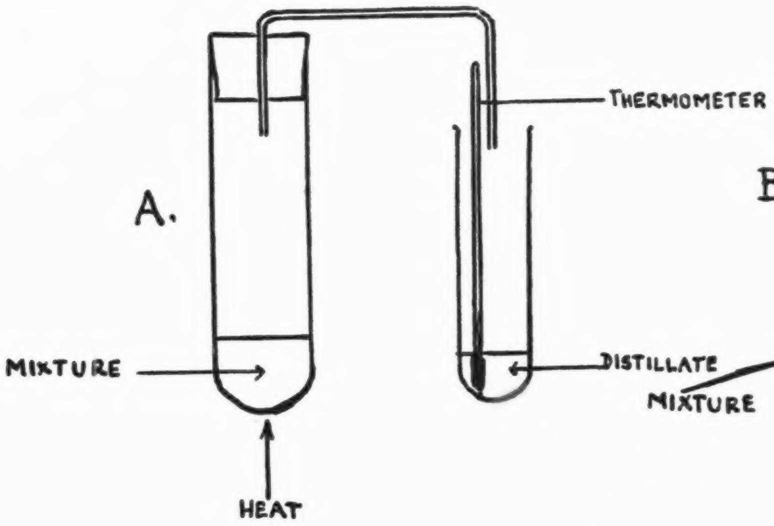
31. If air leaked into chamber 3, which one of the following effects would be seen?

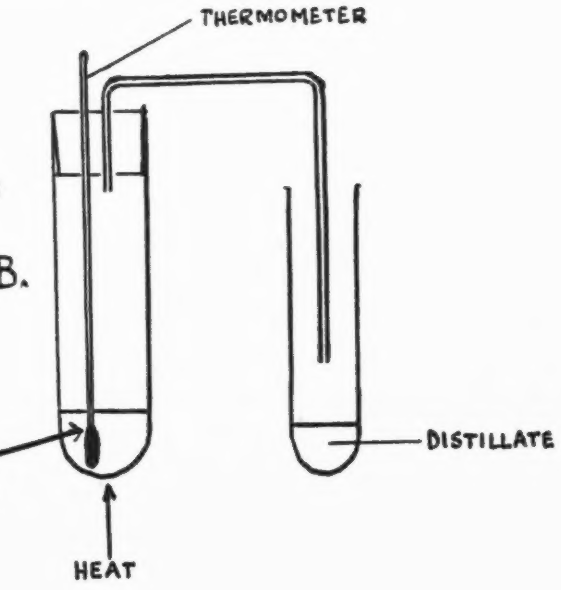
    A. The liquid in 4 would change more rapidly.
    B. The rate of bubbling in 2 would slow down or stop.
    C. The rate of bubbling in 4 would slow down or stop.
    D. Liquid would pass from 4 into 3.
    E. Air would pass from 3 into 2.

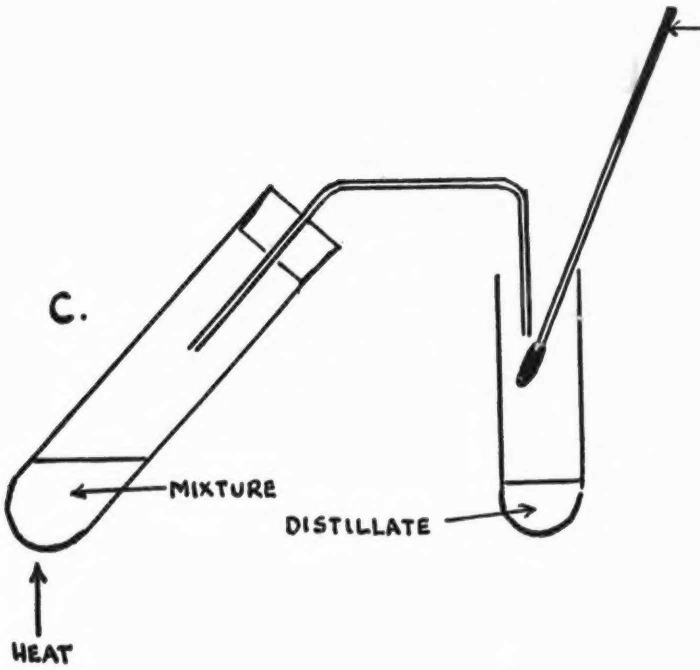
32. Which one of the following kinds of container for the animal would give the quickest result?

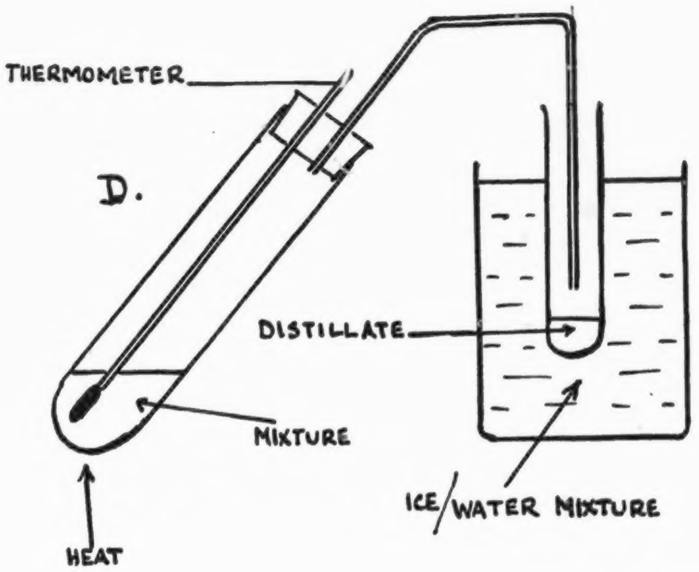
    A. A small container.
    B. A large container.
    C. A container in a bright light.
    D. A container covered with a dark cloth.
    E. The size of the container would not matter.

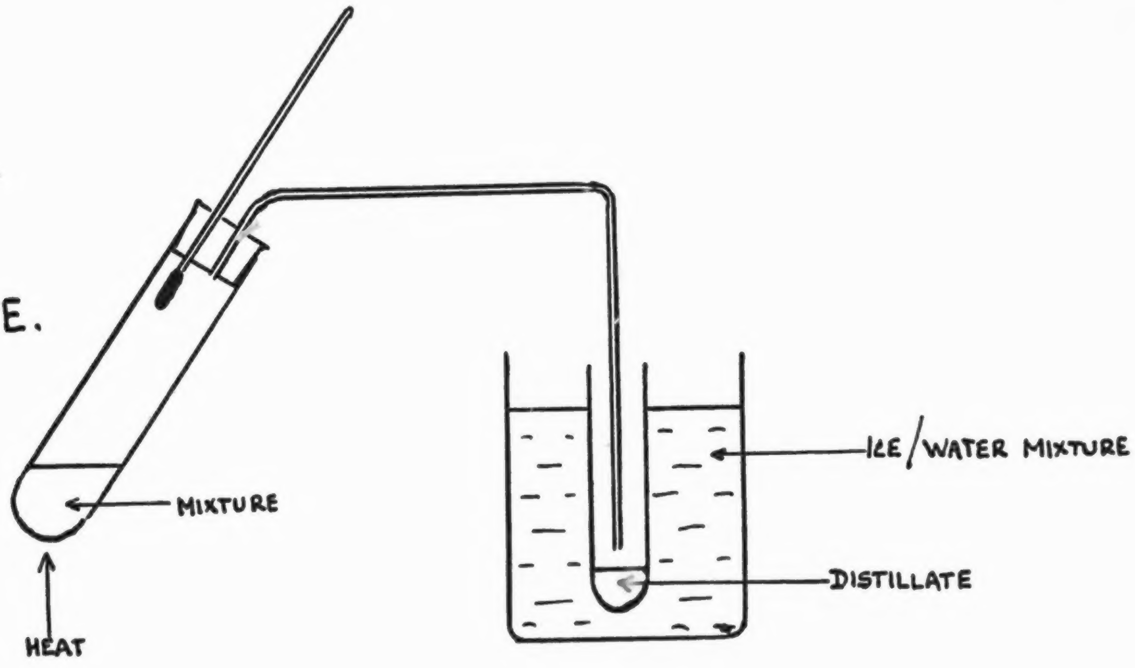
33. A pupil is given 10 cm ^{3} of a mixture of liquids known to have different boiling points and told to separate them by distillation. Which one of the following experimental 'set-ups' would he be wisest to use if he were also asked to note the temperatures at which the various components boiled?


A.
THERMOMETER
MIXTURE
DISTILLATE
HEAT


THERMOMETER
B.
DISTILLATE
MIXTURE
HEAT

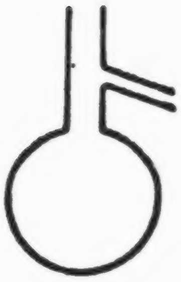

THERMOMETER
C.
MIXTURE
DISTILLATE
HEAT


THERMOMETER
D.
DISTILLATE
MIXTURE
ICE/WATER MIXTURE
HEAT

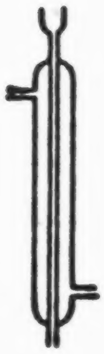

E.
ICE/WATER MIXTURE
MIXTURE
DISTILLATE
HEAT

Answer here: A B C D E.

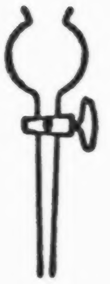
34.



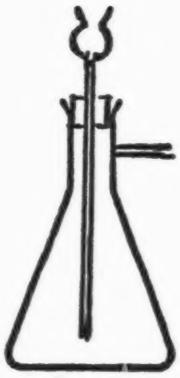
1



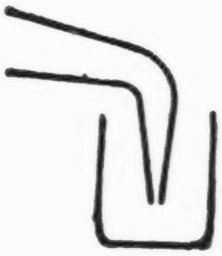
2



3



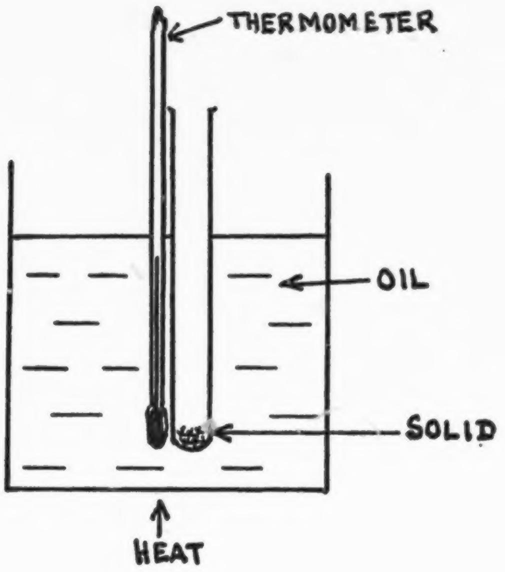
4



5

Condensing gases to liquids is the main use of the piece of glassware labelled:

- A. 1
- B. 2
- C. 3
- D. 4
- E. 5



You are required to find the melting point of a sample of a solid, using the apparatus illustrated above, to find if the sample is pure. You are given the melting point of the pure substance.

When choosing the particular kind of oil which one of the following would you consider to be essential?

- A. The oil should be colourless.
- B. The oil should boil at the same temperature as the melting point of the pure solid.
- C. That the oil should boil at least ten degrees higher than the melting point of the solid.
- D. That the oil should boil at a temperature at least ten degrees lower than the melting point of the solid.
- E. That the oil should have a high density.

36. It is unwise to condense the vapour of a liquid with a boiling point of 240°C in a water-cooled condenser because

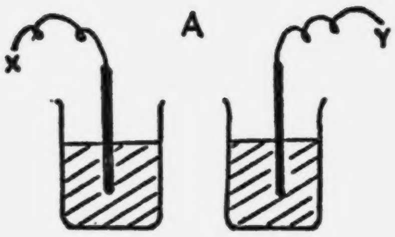
A. the vapour might react with the water,
B. the vapour will not be condensed,
C. the condenser will probably crack,
D. the water will boil,
E. solid will form and block the condenser.

37. A number of different solutions have to be tested to find out whether or not they will each conduct electricity and, if so, what products are liberated.

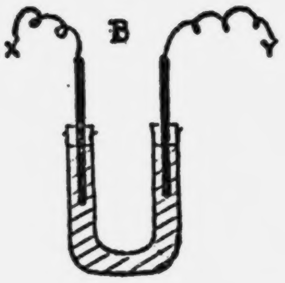
Using the circuit shown below, which of following pieces of apparatus would be most suitable when connected between points X and Y?

(All the beakers and tubes are made of glass, the electrodes of carbon, and solutions are shown shaded.)

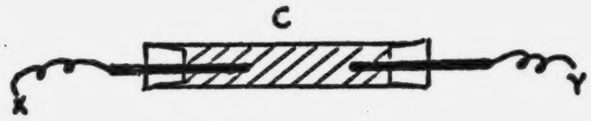
A



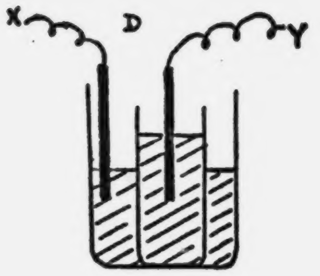
B



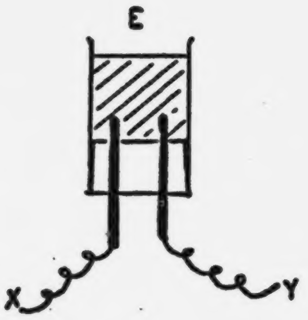
C

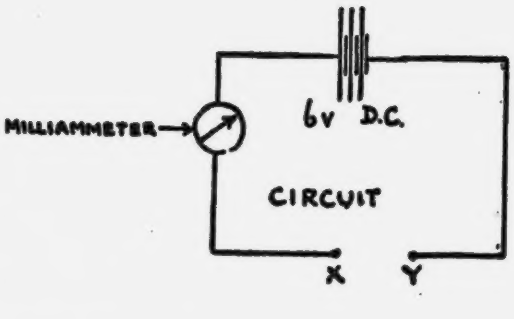


D

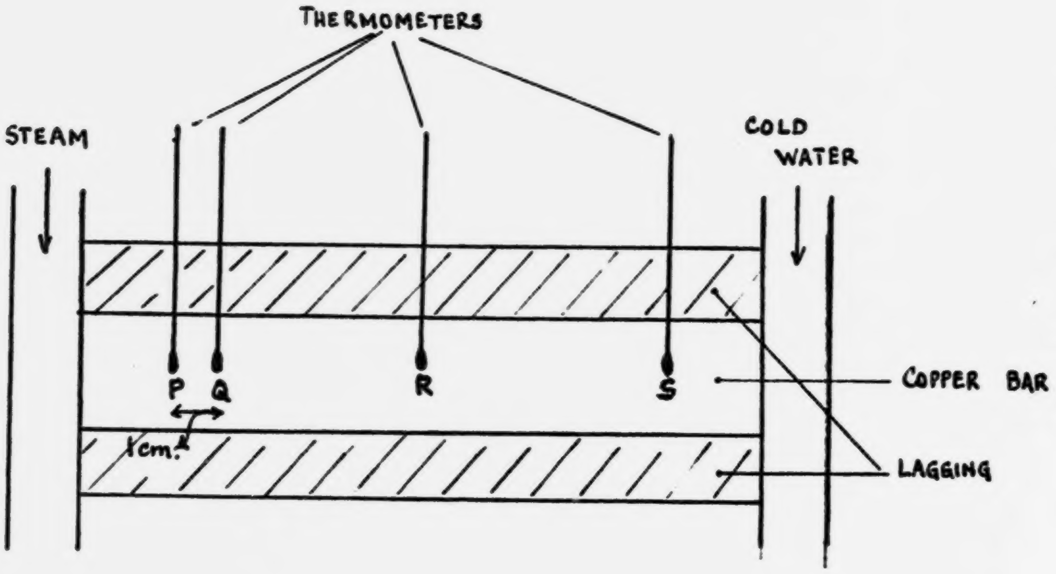


E





38. One end of a well-lagged copper bar is heated and the other kept cold. The temperature at different points on the bar can be read by thermometers dipping into small holes at P, Q, R and S.



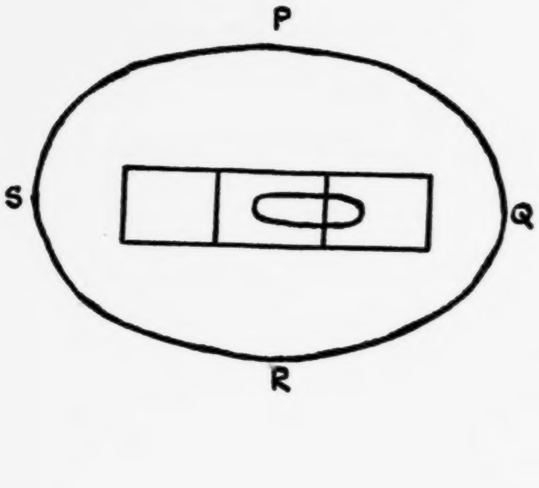
The temperature falls uniformly along the bar, and it is required to find the temperature gradient, or fall in temperature for unit length.

The two thermometers to be read should be those placed at:

A. P and Q
B. P and R
C. P and S
D. Q and S
E. R and S

39. A spirit level is placed on the top of a table and viewed from above when it appears as shown in the diagram. Which of the points P, Q, R and S should be raised as a first step towards making the table level?

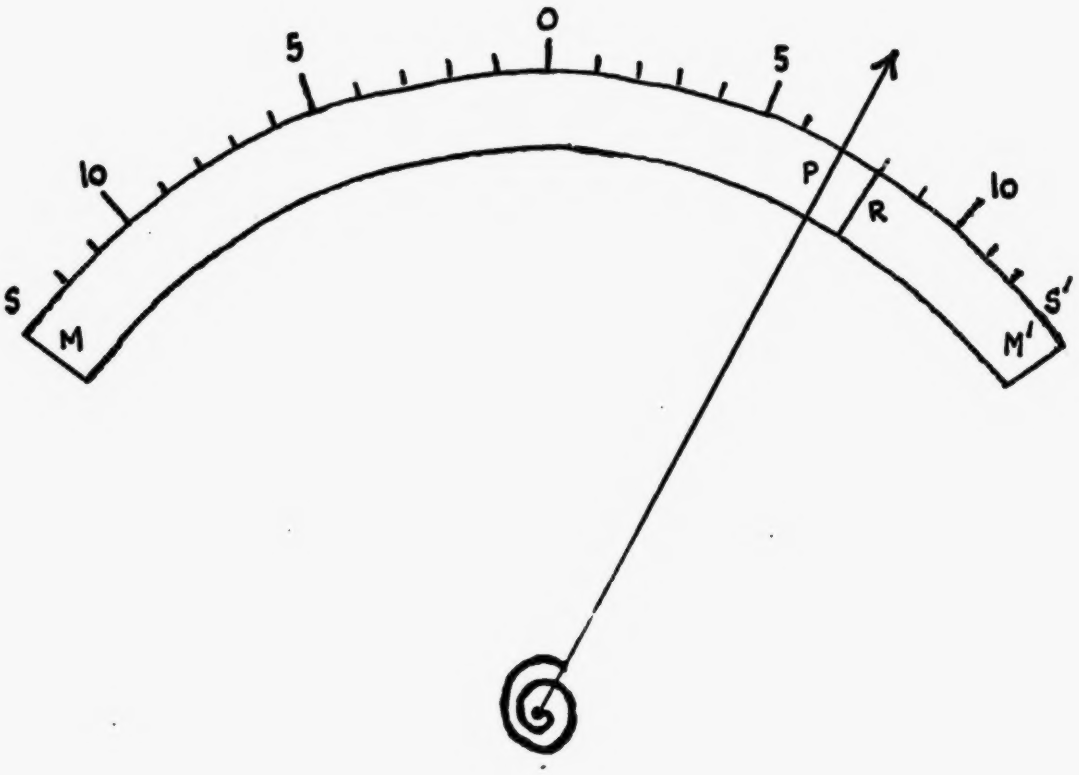
A. P
B. Q
C. R
D. S
E. Q and S together



40. A meter has a pointer P which moves over a strip mirror MM' and a scale SS'. When photographed the meter appears as shown, where R is the reflection of the pointer in the mirror.

What is the meter reading?

A. Between 6 and 7 units.
B. 7 units.
C. Between 7 and 8 units.
D. 8 units.
E. Between 8 and 9 units.



END OF SECTION A

DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO

SECTION B

1. The sun is the only object in our solar system that gives off large amounts of light and heat. We see the moon because it is

   A. reflecting light from the sun.
   B. white hot.
   C. a star.
   D. the biggest object in the solar system.
   E. nearer the earth than the sun.

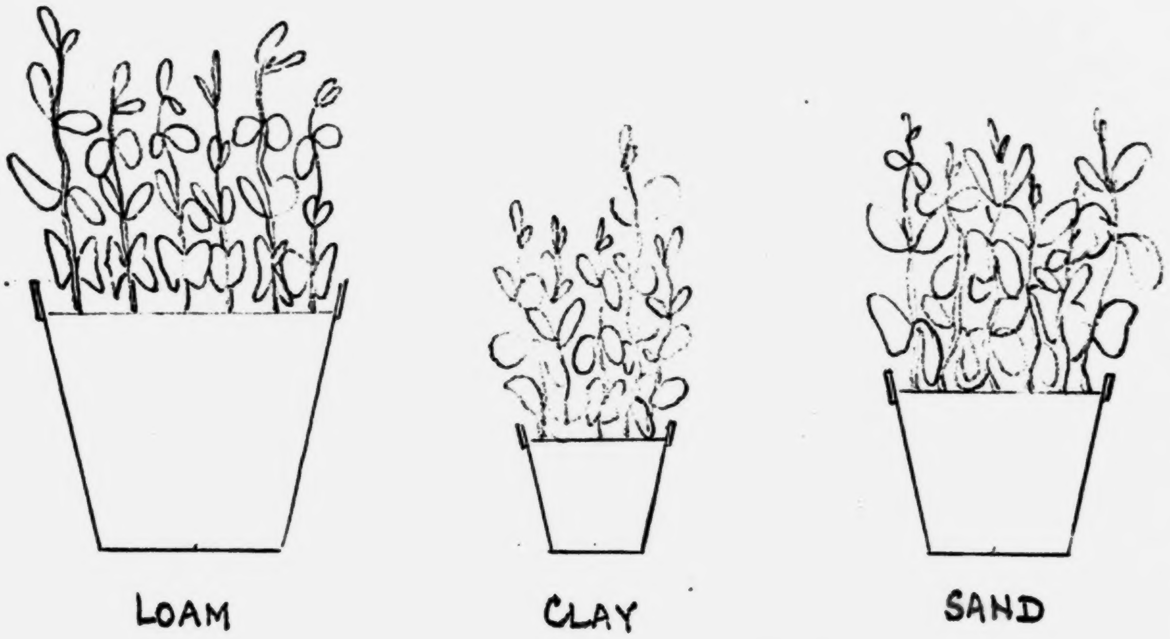
2. In an experiment green leaves were put in a jar and the apparatus was kept in the dark. Lime water was turned cloudy by the gas that formed in the jar. Which of the following gives the best explanation of this result?

   A. O_2 was produced by photosynthesis.
   B. O_2 was produced by respiration.
   C. CO_2 was produced by respiration.
   D. O_2 was used up in respiration.
   E. CO_2 was produced by photosynthesis.

3. John brought the skull of an animal to school. His teacher said she did not know what the animal was but she was sure that it was one that preyed on other animals for its food. Which clue, do you think, led her to this conclusion?

   A. The eye sockets pointed sideways.
   B. The skull was much longer than it was wide.
   C. There was a projecting ridge along the top of the skull.
   D. Four of the teeth were long and pointed.
   E. The jaws could work sideways as well as up and down.

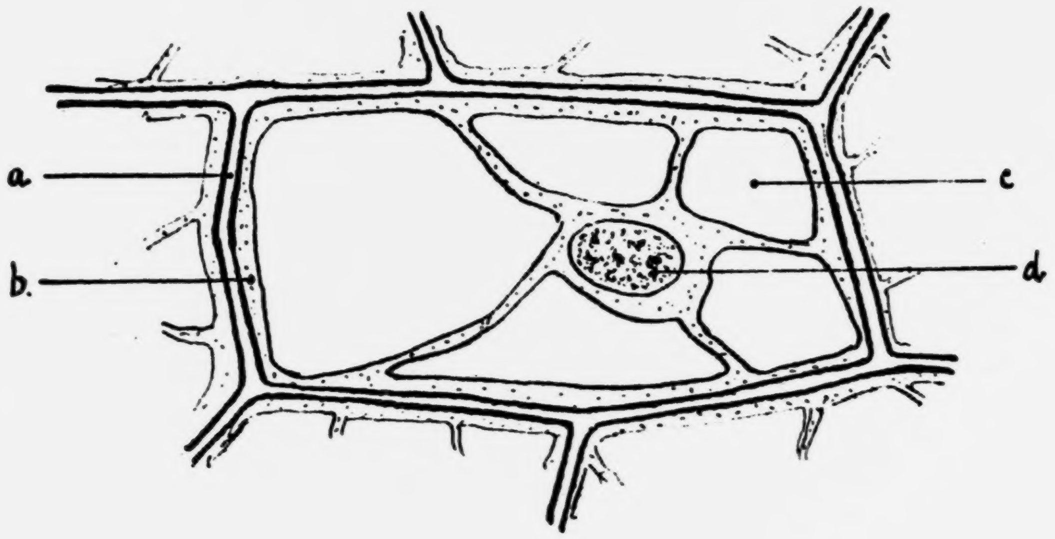
4. Tom wanted to learn which of three types of soil- clay, sand or loam- would be best for growing beans. As shown in the drawing, he found three flowerpots, put a different type of soil in each pot, and planted the same number of beans in each. He placed them side by side on the window sill and gave each pot the same amount of water.



Why do you think that Tom's experiment was NOT a good one?

A. The plants in one pot got more sunlight than the plants in the other pots.
B. The amount of soil in each pot was not the same.
C. One pot should have been placed in the dark.
D. Tom should have used three kinds of seeds.
E. The plants would get too hot on the window sill.

5. The drawing shows a plant cell. In which of the four regions marked might chloroplasts be found?

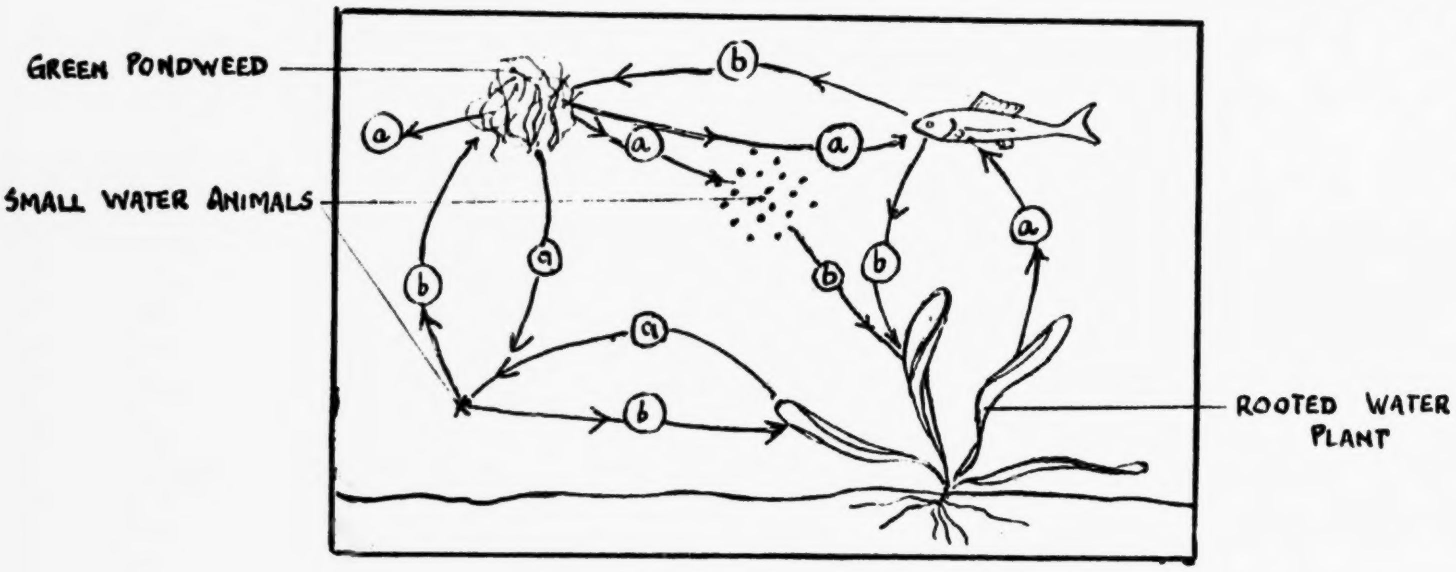


A. a.
B. b.
C. c.
D. d.
E. a and b.

6. The energy for photosynthesis is obtained from

   A. chlorophyll.
   B. chloroplasts.
   C. sunlight.
   D. carbohydrates.
   E. carbon dioxide.

7. The diagram below shows an example of interdependence among aquatic organisms. During the day the organisms either use up or give off ⓐ or ⓑ as shown by the arrows. Choose the right answer for ⓐ and ⓑ from the alternatives given.



   A. a is oxygen and b is carbon dioxide.
   B. a is oxygen and b is carbohydrate.
   C. a is nitrogen and b is carbon dioxide.
   D. a is carbon dioxide and b is oxygen.
   E. a is carbon dioxide and b is carbohydrate.

8. What does an active muscle, that is, a muscle which is doing work, give up to the blood?

   A. Carbon dioxide.
   B. Oxygen.
   C. Nitrogen.
   D. Vitamin B.
   E. Glucose.

9. The inhabitants of the Andes, living at a high altitude, have almost twice as many red corpuscles in their blood as do the people living in the valleys. This is best accounted for on the basis that

   A. the high air pressure in the Andes forces more red corpuscles into the blood.
   B. inhabitants of the Andes breathe more slowly.
   C. greater surface area due to more corpuscles compensates for the low pressure of oxygen.
   D. the inhabitants of the Andes work harder and therefore need more red corpuscles to furnish oxygen to body cells.
   E. the low air pressure speeds the blood circulation so that more red corpuscles are needed.

10. What is the essential process found in all cases of sexual reproduction?

A. A male organism must find a mate.
B. Two different organisms with special organs for reproduction must take part.
C. The nucleus of a male gamete must fuse with that of a female gamete.
D. A spermatozoon must reach an egg cell.
E. A female gamete must have a store of food for the embryo.

11. Paint stops the rusting of iron by

A. preventing nitrogen from coming in contact with the iron.
B. reacting chemically with the iron.
C. preventing carbon dioxide from coming in contact with the iron.
D. changing the rate at which iron reacts chemically.
E. preventing oxygen and moisture from coming in contact with the iron.

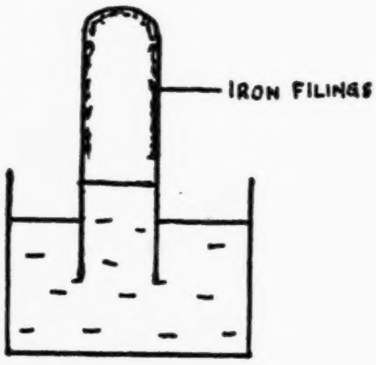
12. Why will a pile of grain burn only very slowly whereas flour dust suspended in air is explosive?

A. The heat produced when small particles burn is greater.
B. Grinding the grain changes its composition.
C. Small particles have a greater surface area in contact with air.
D. Small particles possess more energy than large particles.
E. The coat of the grain does not burn.

13. Two given elements combine to form a poisonous compound. What can be concluded from this fact?

A. Both elements are certainly poisonous.
B. At least one element is certainly poisonous.
C. One element is poisonous, the other is not.
D. Neither element is poisonous.
E. None of these conclusions can be reached.

14. A test tube coated with iron filings on the inside was clamped vertically in a beaker of water. Water gradually rose a short distance in the test tube as shown in the sketch.



This is because

A. water condenses inside the tube.
B. iron gives off a gas which dissolves in the water.
C. iron reacts with the glass of the tube.
D. iron reacts with oxygen from the air inside the tube.
E. physical changes take place but no chemical change occurs.

15. The presence of ions in a water solution is most directly detected by

A. finding out if it conducts electricity.
B. measuring the density of the solution and comparing it with those of the pure solute and water.
C. seeing if the solution has an electric charge.
D. evaporating the solution and testing the residue for conductivity.
E. adding an ionic substance and seeing if there is a reaction.

16. Which of the following oxides turns red litmus blue when added to water? An oxide of

A. phosphorus.
B. carbon.
C. sulphur.
D. nitrogen.
E. calcium.

17. In which of the following cases will heat be generated?

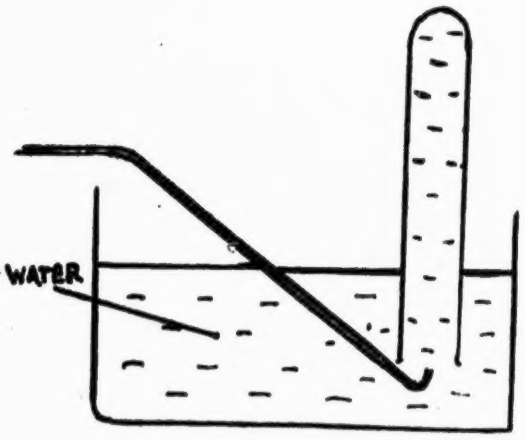
1. Sodium hydroxide dissolves in water.
2. Water is decomposed.
3. Ice thaws.
4. Water evaporates.
5. Concentrated sulphuric acid dissolves in water.

A. 1 and 2.
B. 1 and 5.
C. 3 and 4.
D. 3, 4 and 5.
E. 2, 3, 4 and 5.

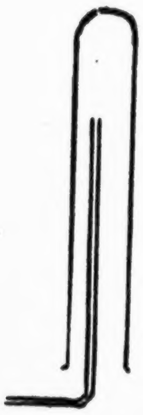
18. You find what appear to be salt (sodium chloride) deposits. In order to learn what the deposits are, which of the following items of information would be most valuable?

A. Percentage of sodium chloride in the sample.
B. Percentage of magnesium chloride in the sample.
C. Specific gravity of the sample.
D. Chemical composition of the sample.
E. Solubility in water of the sample.

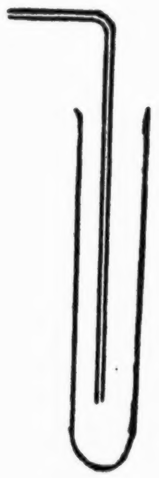
19. Which is the most suitable apparatus from those shown below for collecting oxygen?



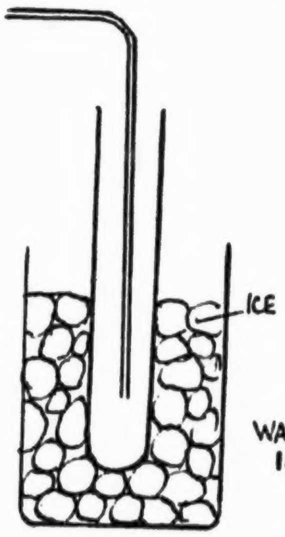
A



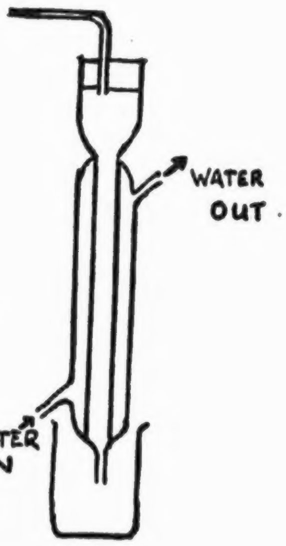
B



C



D

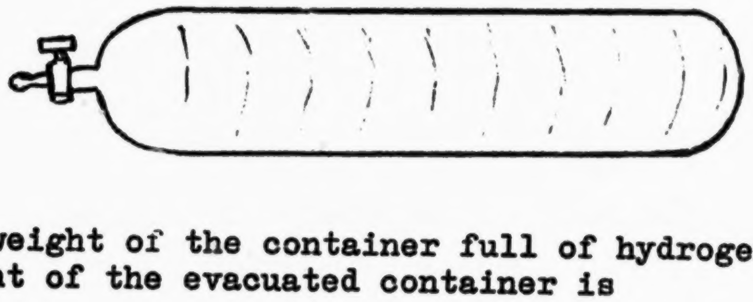


E

20. Which of the following does not consist mainly of carbon atoms?

A. Diamond.
B. Graphite.
C. Soot.
D. Ruby.
E. Charcoal.

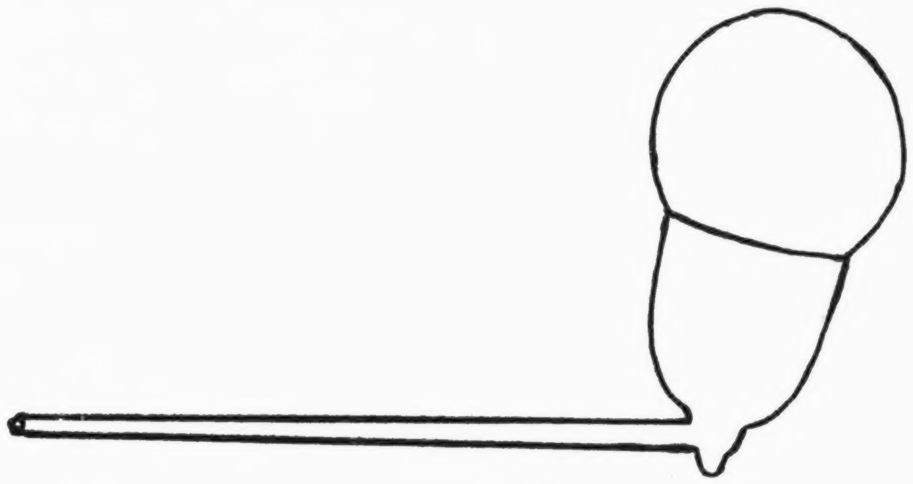
21. An iron container is evacuated and weighed. Then it is filled with hydrogen gas and weighed again.



The weight of the container full of hydrogen compared to the weight of the evacuated container is

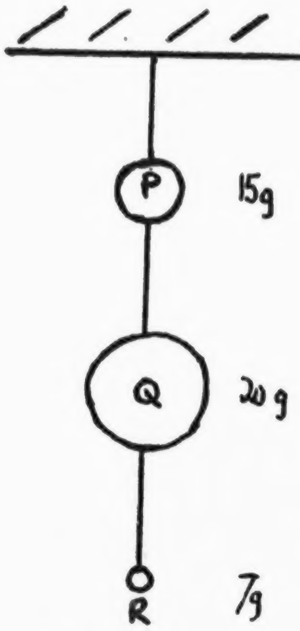
A. less.
B. greater.
C. the same.
D. greater or less depending on the volume of the gas in the container.
E. greater or less depending on the temperature of the gas in the container.

22. Ann was playing with a bubble pipe. When the bubble was the size of the one in the picture, she took the pipe out of her mouth. What do you think happened to the bubble after that?



- A. It got larger for a time and then stayed at this size.
- B. It got smaller for a time and then stayed at this size.
- C. It got smaller and smaller and disappeared into the pipe.
- D. It stayed on the pipe without getting larger or smaller.
- E. It became larger and larger until it burst.

23. The objects P, Q and R of mass 15 g, 20 g and 7 g respectively, are hung with a thread as shown in the figure.

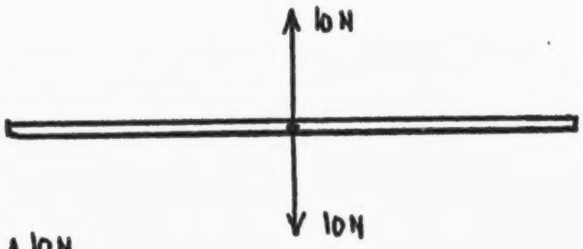


What is the tension between P and Q?

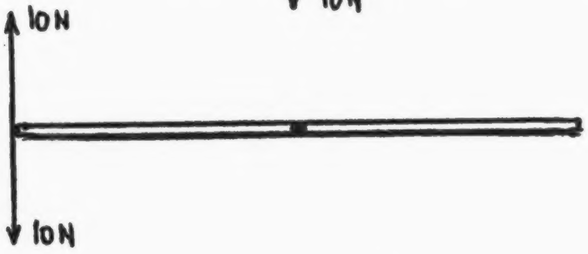
- A. 42 gf.
- B. 35 gf.
- C. 27 gf.
- D. 15 gf.
- E. 7 gf.

24. A uniform rod, pivoted at its centre, is acted on by two forces in the same plane. In which case is there a turning effect?

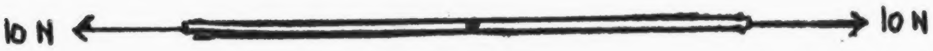
A



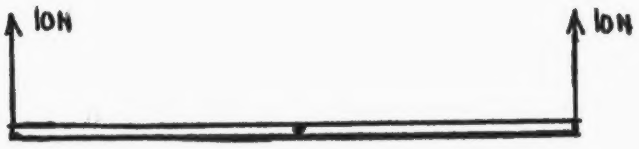
B



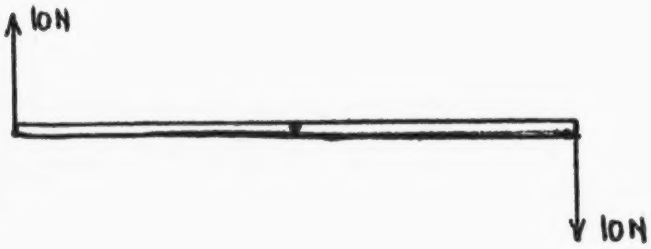
C



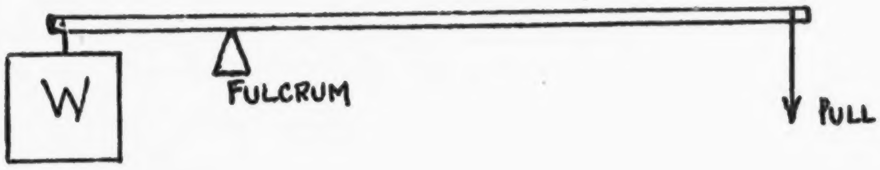
D



E

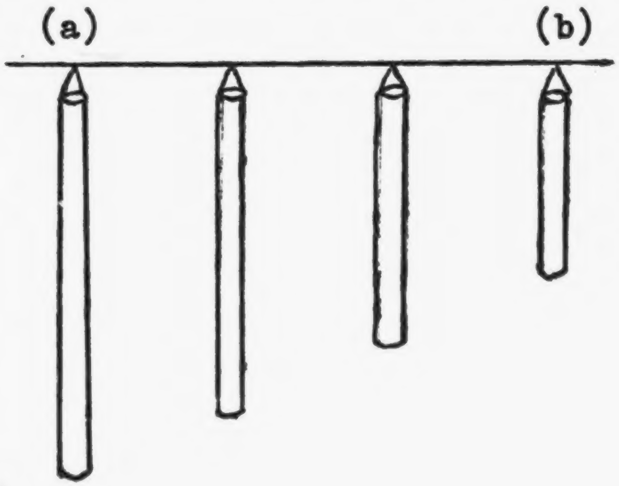


25. The reason for using the lever shown in the diagram to raise the weight W is that


W
FULCRUM
PULL

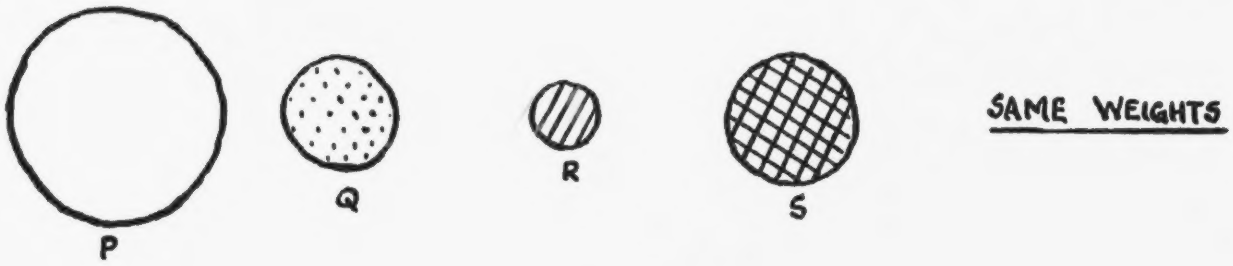
A. less energy is required.
B. it is quicker.
C. less force is needed.
D. less movement is required.
E. less work has to be done.

26. Some boys made a set of chimes by cutting four pieces of pipe of different lengths from a long metal pipe and hanging them as shown in the picture below. Which of the pipes gave the lowest note when they struck it with a hammer?



A. Pipe (a).
B. Pipe (b).
C. All gave the same note.
D. You cannot tell without trying.
E. It depends on where you hit it.

27. Four balls, P, Q, R and S shown in the figures, are made of different materials, but have the same weight.



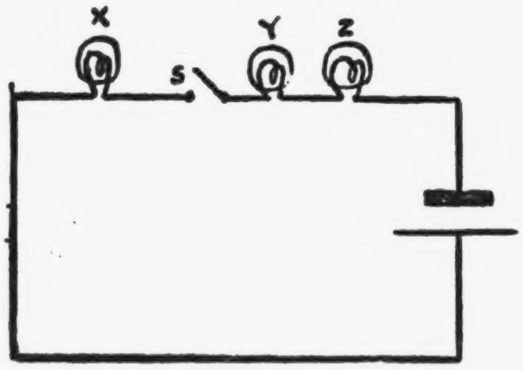
Which one of P, Q, R and S has the highest density?

A. All have the same density.
B. You cannot tell without an experiment.
C. It depends on how the volumes are measured.
D. P.
E. R.

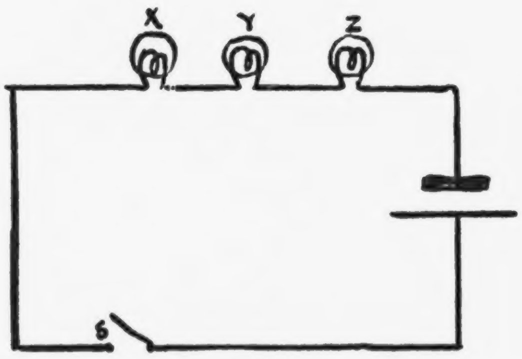
28. A metal tray feels colder than its plastic handle. This is because

A. metal always has a lower temperature than plastic.
B. metal radiates much more heat than plastic and so cools more quickly.
C. metal conducts the heat away from your hand better than plastic.
D. plastic is a better heat conductor than metal.
E. a smooth surface allows a closer contact than a rough one.

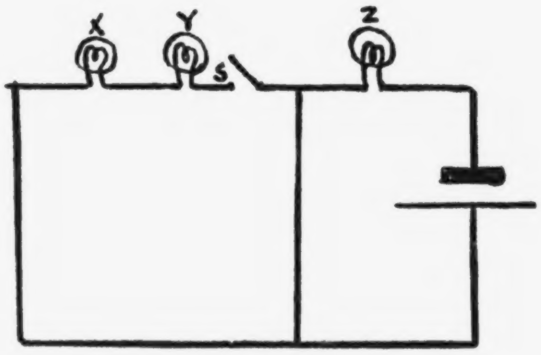
29. X, Y and Z represent three lamps in a circuit, which also includes a battery and a switch S. When the switch is open X fails to light while Y and Z do. Which of the following circuits is it?



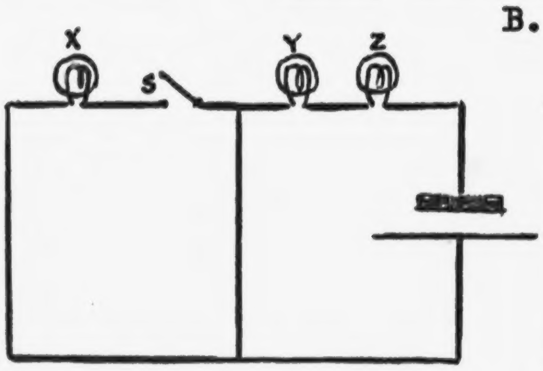
A.



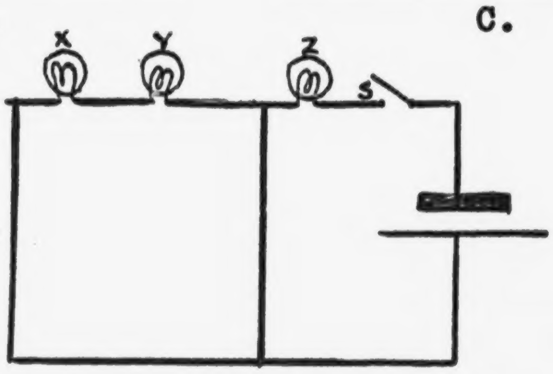
B.



C.



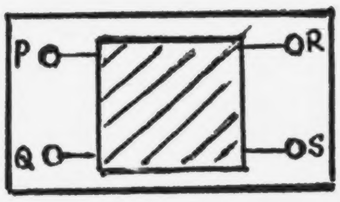
D.



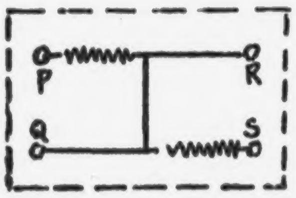
E.

30. The figure shows a box with four terminals, P, Q, R and S. The following observations were made.

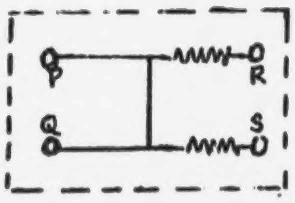
1. There is a certain amount of resistance between P and Q.
2. Resistance between P and R is twice that between P and Q.
3. There is not any appreciable resistance between Q and S.



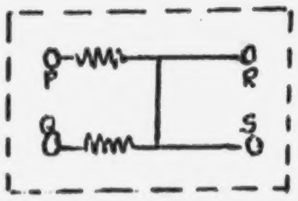
Which of the following circuits is most likely to be within the box, assuming the resistances shown to be equal?



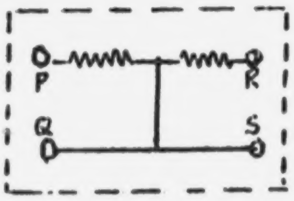
A



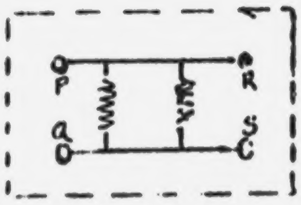
B



C

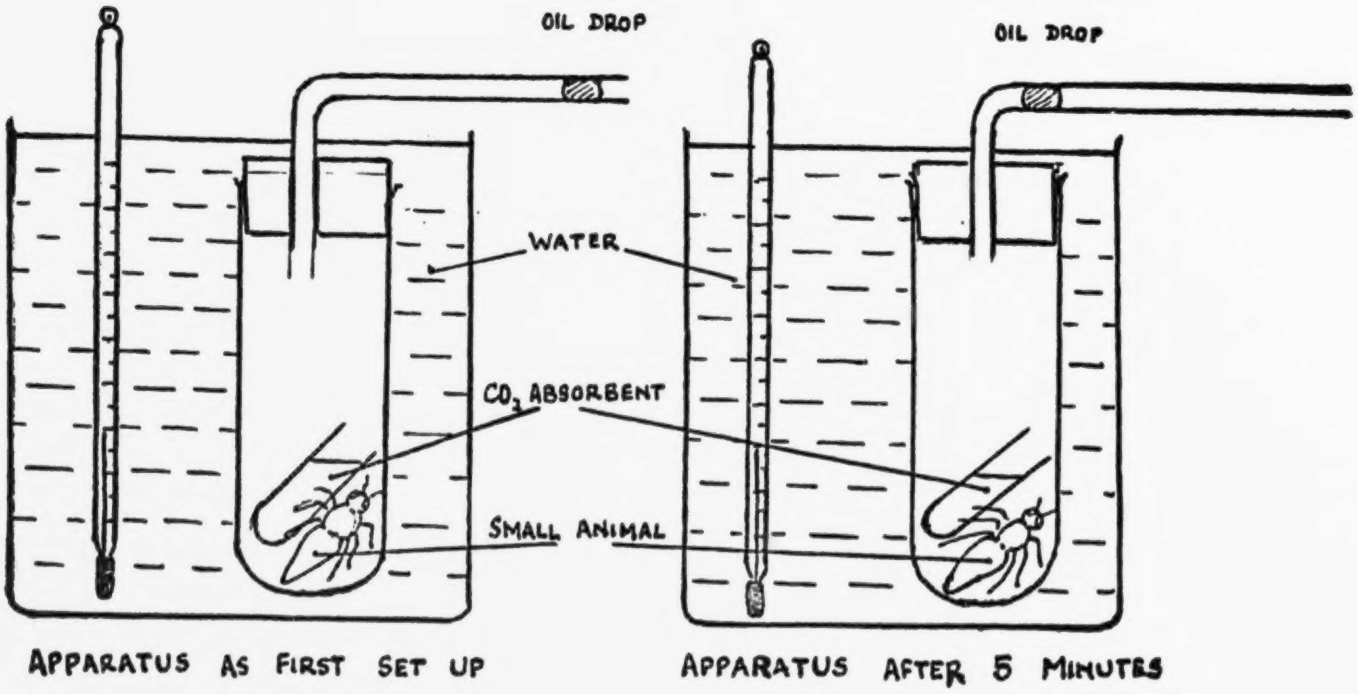


D



E

Questions 31, 32, 33 and 34 refer to the following diagram:



Animals take in oxygen and give out carbon-dioxide. Ordinary air contains very little carbon-dioxide.

31. Which of the following functions is measured with this apparatus?

    A. The rate of movement of the animal.
    B. The amount of heat produced by the animal.
    C. The rate of respiration of the animal.
    D. The effect of carbon dioxide on the animal.
    E. The amount of carbon-dioxide absorbed by the animal.

32. Why are a water bath and thermometer used?

    A. To keep the animal cool.
    B. To keep the animal warm.
    C. To keep the temperature from changing.
    D. To prevent leakage of gases from the apparatus.
    E. To keep the pressure constant around the animal.

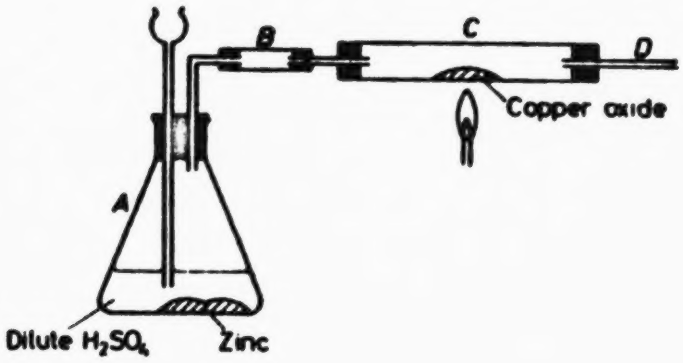
33. Which one of the following is true after 5 minutes?

    A. The volume of air in the apparatus has increased.
    B. The volume of air in the apparatus has decreased.
    C. No change has taken place.
    D. No further movement of the oil drop can be expected.
    E. The oil drop will now begin to move in the other direction.

34. By which one of the following methods could the apparatus be made sensitive to smaller changes?

A. By using a smaller test tube.
B. By raising the temperature of the water.
C. By using more of the carbon dioxide absorbent.
D. By using a wider tube for the oil drop.
E. By using a narrower tube for the oil drop.

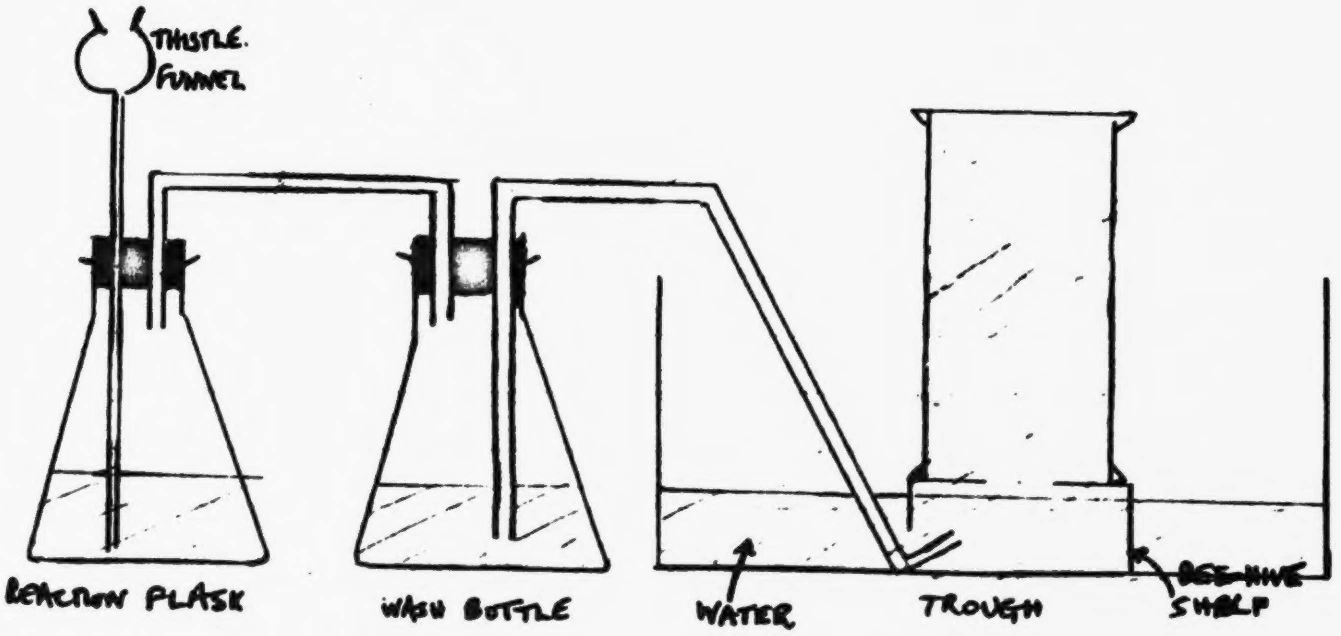
35. The apparatus shown below is assembled to reduce copper (II) oxide with hydrogen gas.



Hydrogen gas is produced in generator 'A' and is passed over hot copper (II) oxide in glass tube 'C'. Tiny droplets of water collect on the inside of tubes 'C' and 'D'. These droplets could possibly come from the generator 'A', being carried through into the rest of the apparatus by the stream of hydrogen. In order to test the truth of this explanation it would be best to

A. heat tube 'C' further
B. heat the generator 'A'
C. add a calcium chloride drying tube at the right of tube 'C'
D. add dry calcium chloride to tube 'B'
E. try to produce hydrogen by the reaction of zinc with a different acid.

36.

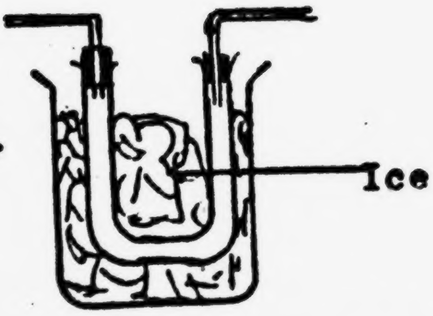


Which one of the following correctly list the errors in the apparatus diagram shown above for preparing a water-insoluble gas?

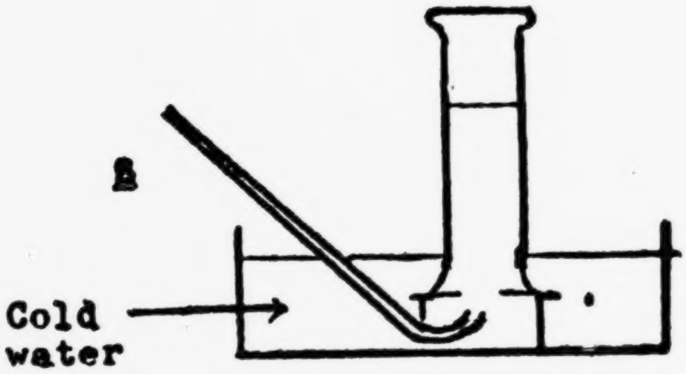
A. The thistle funnel tube goes below the level of the liquid in the flask and the wash bottle is connected the wrong way around.
B. The level of water in the trough should be above the level of the top of the bee-hive shelf.
C. The wash bottle is connected the wrong way around, and a level of liquid should be shown in the bowl of the thistle funnel.
D. The tube leading from the reaction flask should come from below the level of the liquid in that flask.
E. The water in the trough should cover the bee-hive shelf, and the wash-bottle should be connected the other way around.

37.

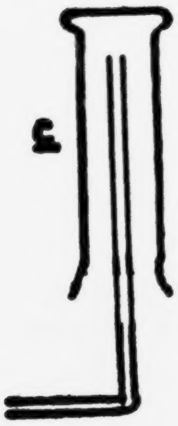
A.



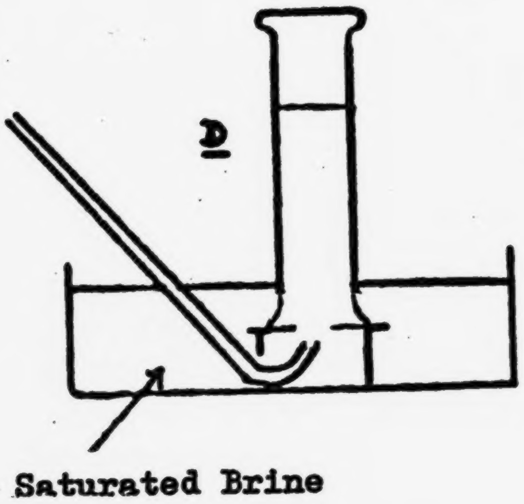
B



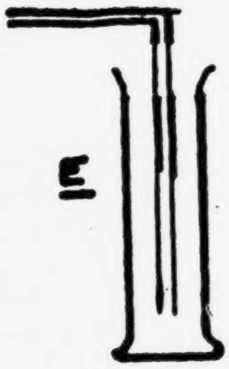
C



D

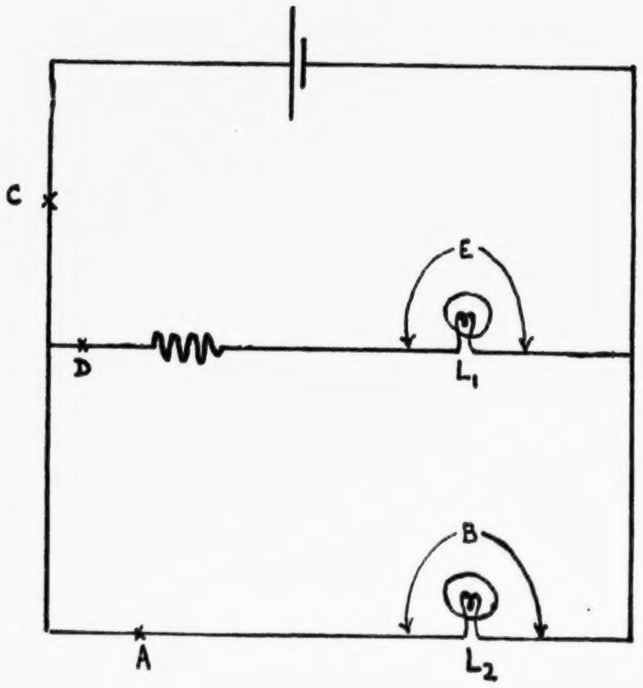

Saturated Brine

E



Which of the apparatus assemblies shown above would be the most suitable apparatus for collecting a gas which was less dense than air, soluble in water and with a boiling point of -180° C?

Questions 38, 39 and 40 refer to the following circuit diagram.



For the following questions, indicate the letter denoting the appropriate responses in the blank spaces on the answer card.

38. Indicate where you would place a switch to cut off lamp L_2 only.

39. Indicate where you would place a variable resistor to dim both lamps.

40. Indicate where you would place a variable resistor to dim lamp L_2 only.

END OF BOOKLET 4

I. E. A.

IEA/10 A

BOOKLET 10

SCIENCE

BOOKLET 10

SCIENCE

This test contains questions dealing with different branches of Science. Some you will know about from your school work, some from your general knowledge and others you will be able to answer by using commonsense. Others you may not be able to do. Do not waste time over questions you cannot do; leave them and go on to the next question. You can come back to questions you have missed later, if you have time. You may answer even if you are not quite sure, but do not guess blindly.

Each of the questions or unfinished statements in this test is followed by five suggested answers, lettered A,B,C,D, and E. You have to decide which one answer you think best and then on your answer card make a solid pencil mark in the oval containing the correct answer letter.

Here is an example of how to fill in the answer on your answer card. Remember that the examples given on this page are to be answered in the section marked L on your answer card.

1. How long does the earth take to travel once around the sun?

   A. A day.
   B. A week.
   C. A month.
   D. A year.
   E. None of the above.

Since the earth travels round the sun in a year, the answer space D should be marked. This has been done on the answer card for the question 1 in the example section L.

Now try these three questions for practice. Fill in the space of your chosen answer on the answer card in section L.

2. Water would be turned into ice by

   A. heating it.
   B. stirring it quickly.
   C. putting salt in it.
   D. pouring it into a shallow dish.
   E. cooling it.

3. Which day of the year in the southern hemisphere has the longest period of daylight?

   A. 21st January.
   B. 21st March.
   C. 22nd December.
   D. 23rd September.
   E. 22nd June.

Sometimes you may be asked to pick out the one wrong answer or the one that does not fit in with the others.

4. Which of the following does NOT belong to the same group as the others?

   A. Eagle.
   B. Lion.
   C. Mouse.
   D. Elephant.
   E. Deer.

DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO.

SECTION A

1. A student wrote the following note on a laboratory project.

"Using a cork-borer I obtained several cylinders from a large potato. The cylinders were 7 cm long and 0.5 cm in diameter. I kept them on a dry plate and measured them again on the following day. I found that all of them had become shorter and thinner."

The student then put the cylinders into a beaker of tap water and wrote.
"If I measure them tomorrow I should find that they have all returned to their original size."
In writing this the student was making

A. a statement of fact.
B. an observation.
C. a tentative conclusion.
D. an experimental procedure.
E. a hypothesis.

2. Which of the following features present in an animal would make you certain it was a mammal?

A. A vertebral column.
B. Small tufts of "hair - like" bristles on its skin.
C. Two pairs of limbs.
D. Two pairs of milk glands.
E. Five digits on each fore-limb.

Questions 3 and 4 refer to the following data.

Several different plant parts were placed in sealed containers of equal volume. The amounts of CO_2 (carbon dioxide) used by the plant parts under different conditions were measured and recorded.

Container	Plant	Plant Part	Vol. of Plant Part (cm^3)	Colour of Light	Temp. (°F)	Time Elapsed (days)	CO_2 Used (cm^3)
1	Myrtle	Leaf	100	Red	60	2	150
2	Myrtle	Leaf	100	Red	80	2	200
3	Myrtle	Stem	100	Blue	70	2	50
4	Oak	Root	100	Blue	80	3	0
5	Oak	Leaf	100	Orange	80	2	100
6	Oak	Leaf	100	Orange	80	3	150

Assume that the experimental conditions not listed were identical in all six containers.

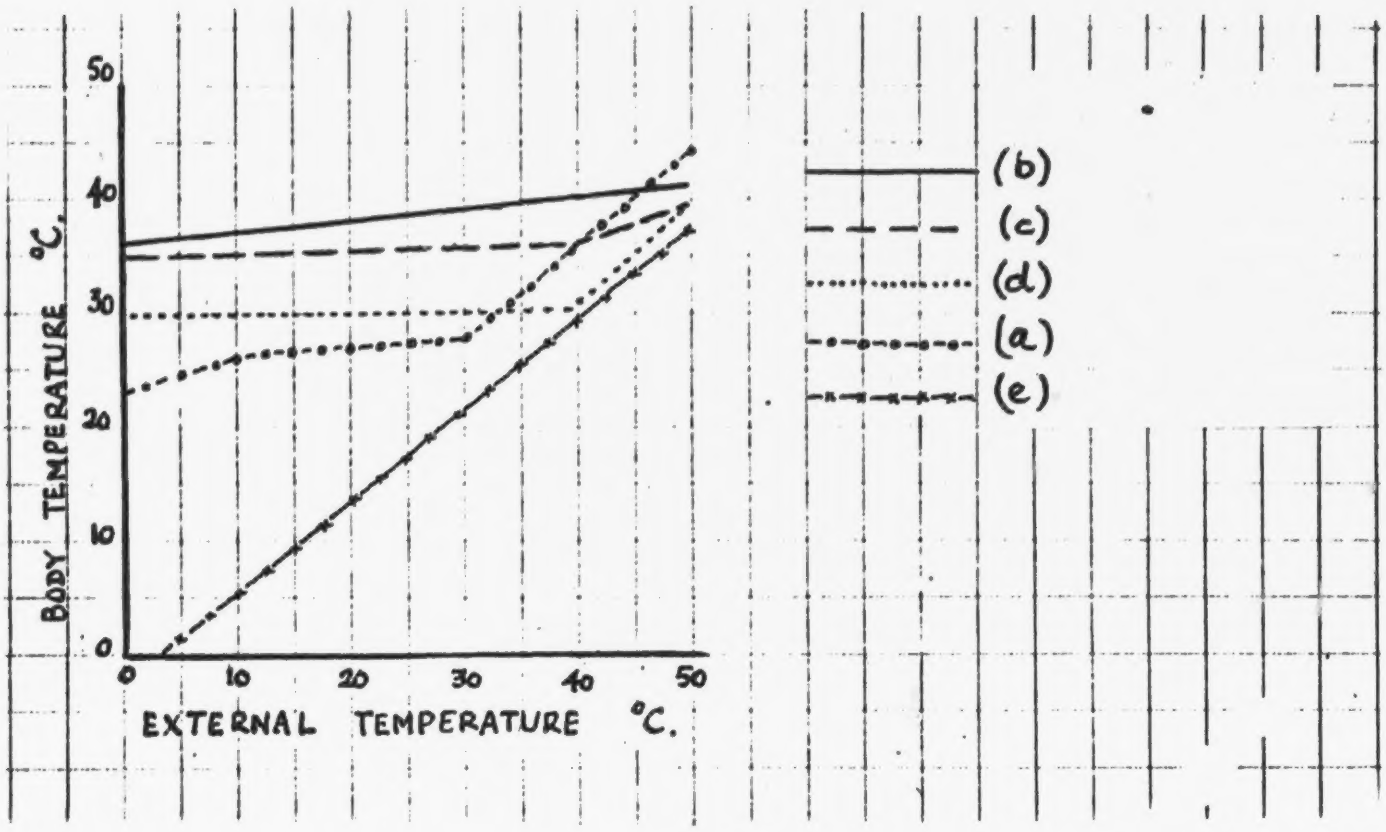
3. **On the basis of the data in the table, one could properly compare the amount of CO_2 used in one day by**

   A. **myrtle leaves at 60°F and at 80°F.**
   B. **myrtle stems and myrtle leaves.**
   C. **myrtle leaves in red light and in orange light.**
   D. **oak leaves in orange light and in blue light.**
   E. **oak leaves at 60°F and at 80°F.**

4. **How much CO_2 do the experimental data indicate that the oak leaves used?**

   A. **They use more CO_2 in orange light than in blue light.**
   B. **They use more CO_2 at 80°F than at 60°F.**
   C. **They use more CO_2 per day than did the myrtle leaves.**
   D. **They use an average of 50 cm^3 CO_2 each day.**
   E. **They use 50 cm^3 of CO_2 each day.**

5. The graph shows the results obtained when the changes in body temperature resulting from changes in external air temperature for various animals were being investigated.



Which of these curves is most likely to represent the results obtained from a lizard?

A. a.
B. b.
C. c.
D. d.
E. e.

6. A lizard in a laboratory at 20°C was placed close to three temperature controlled areas, one at a temperature of 50°C, one at a temperature of 37°C and one at a temperature of 15°C. It always moved to the 37°C area.

This behaviour is an example of

A. a response to a stimulus.
B. reasoning.
C. a reflex arc.
D. geotropism
E. thigmotaxis

7. What is the essential process found in all cases of sexual reproduction?

   A. A male organism must find a mate.
   B. Two organisms with special organs for reproduction must take part.
   C. The nucleus of a male gamete must fuse with that of a female gamete.
   D. A spermatozoon must reach an egg cell.
   E. A female gamete must have a store of food for the embryo.

8. Which of the following is an accurate statement about hibernating animals?

   A. There is no life in any part of the animal.
   B. The animal ceases to breathe.
   C. The animal is absorbing energy for use when it returns to active life.
   D. The animal's body temperature is higher than when it is active.
   E. The animal is using less energy than during the period of active life.

9. When 16 g of dilute sulphuric acid was poured onto 3 g of zinc in an open test tube, hydrogen gas was generated. What was the weight of the contents of the test tube after the reaction was completed?

   A. Slightly more than 19 g.
   B. Slightly less than 19 g.
   C. Equal to 19 g.
   D. Slightly less than 16 g.
   E. Equal to 16 g.

10. A sample of oxygen gas in a plastic bag weighed 0.32 g. A sample of another gas in an identical bag, under the same conditions of temperature and pressure, weighed 0.26 g.

    Atomic weight of oxygen = 16.

    What is the weight of 1 mole of the second gas?

    A. 13 g.
    B. 26 g.
    C. 48 g.
    D. 58 g.
    E. 64 g.

11. One kind of stainless steel contains approximately 13% chromium and 1% nickel by weight; the rest is iron. Which of the following gives the closest approximation to the ratio of the number of chromium atoms to iron atoms in this stainless steel?

Atomic weight of chromium = 52   Atomic weight of iron = 56

A. $\frac{13}{52} : \frac{14}{56}$.

B. $\frac{13}{52} : \frac{86}{56}$.

C. $\frac{13}{108} : \frac{86}{108}$.

D. $\frac{13}{(100-52)} : \frac{87}{(100-56)}$.

E. $\frac{13}{100} \times 52 : \frac{86}{100} \times 56$.

Questions 12-14 relate to the simplified periodic table with main group elements shown below:

	Group							
Period	IA	IIA	IIIA	IVA	VA	VIA	VIIA	0
1								
2	F			N	P	Q	T	
3	G	K	L			R		U
4	H		M			S		V
5	I							W
6	J			O				X

12. Which element in the table has the smallest nuclear charge?

A. F.
B. U.
C. J.
D. X.
E. T.

13. In the third period of the table, the most metallic element is

A. G.
B. K.
C. L.
D. R.
E. U.

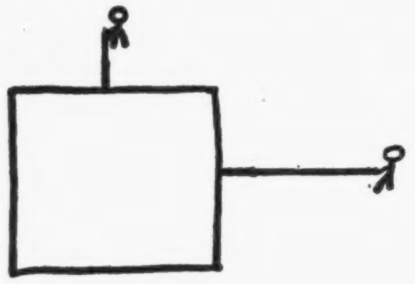
14. Which element in Group IA would most easily form an ion of +1 charge when in the gaseous state?

A. F.
B. G.
C. H.
D. I.
E. J.

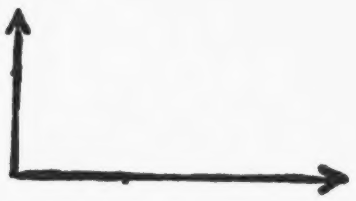
15. In a chemical sense human respiration can be described as

- A. double decomposition.
- B. a gas-phase reaction.
- C. anaerobic respiration.
- D. gaseous diffusion.
- E. slow combustion.

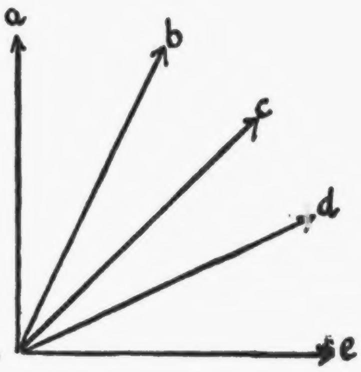
16. Two men pull on a box by ropes as shown in the diagram. The lengths of the arrows on the force diagram are drawn proportional to the magnitude of the forces exerted by the men. In which of the directions shown in the third diagram will box move to tend to move?



a.



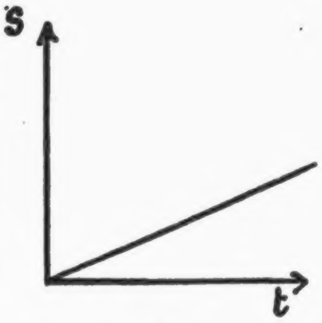
b. Force diagram



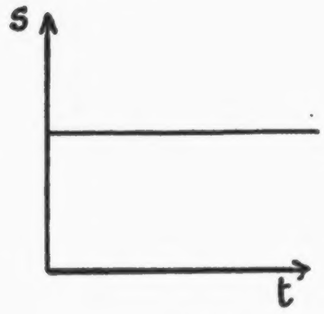
c.

- A. a.
- B. b.
- C. c.
- D. d.
- E. e.

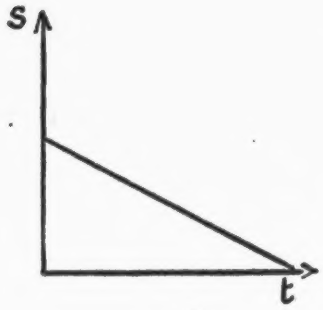
17. Which graph best represents how the distance (s) depends on time (t) in the case of a steel ball rolling down an inclined plane? (Assume retarding forces are negligible.)



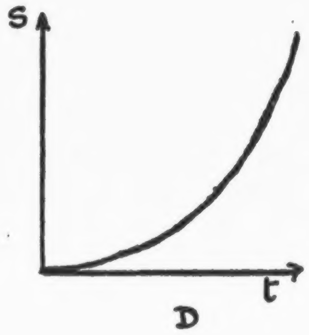
A



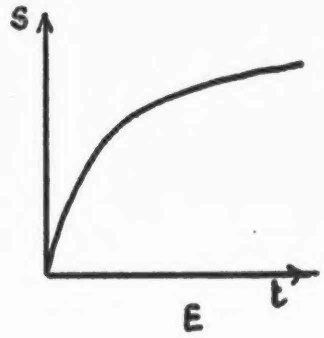
B



C



D

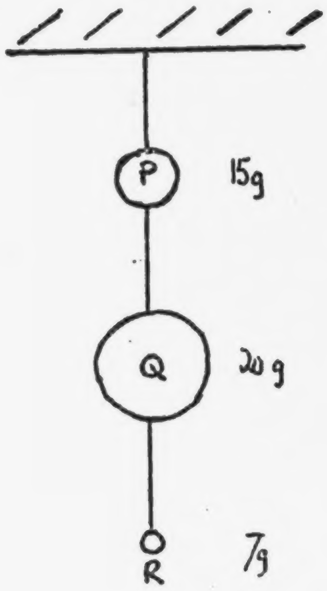


E

18. The objects P, Q and R of mass 15 g, 20 g and 7 g respectively, are hung with a thread as shown in the figure.

What is the tension in the thread between P and Q?

A. 42 gf.
B. 35 gf.
C. 27 gf.
D. 15 gf.
E. 7 gf.



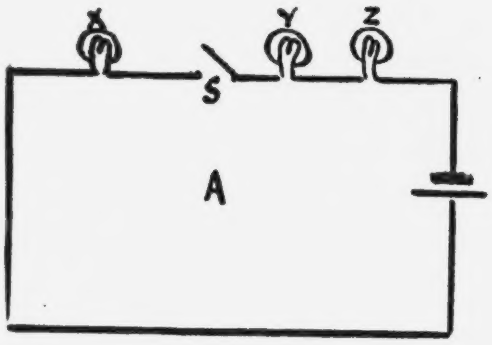
19. Which of the following would occur if a moving atom were to collide with a stationary atom at room temperature?

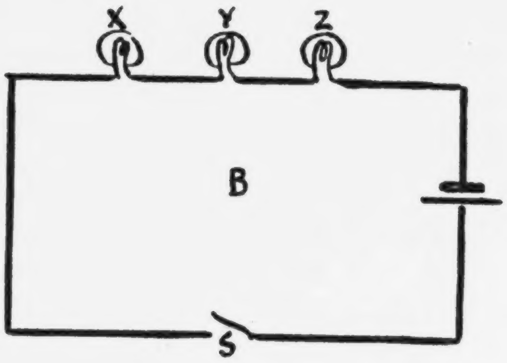
A. Both atoms would lose kinetic energy.
B. Both atoms would gain kinetic energy.
C. Kinetic energy would be gained by the moving atom and lost by the stationary atom.
D. The kinetic energy of both atoms would be unaffected.
E. Kinetic energy would be lost by the moving atom and gained by the stationary atom.

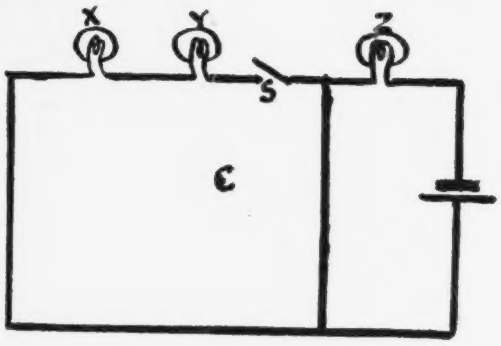
20. A sensitive mercury-in-glass thermometer registering room temperature is immersed in boiling water. The mercury level first drops slightly and then rises. Why does the drop occur?

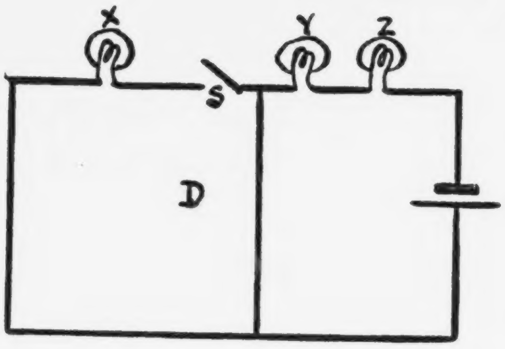
A. The specific heat of glass is greater than that of mercury.
B. The coefficient of expansion is greater for glass than for mercury.
C. The glass expands before the mercury does.
D. At room temperature, mercury has a negative coefficient of expansion like that of water from $0^{\circ}C$ to $4^{\circ}C$.
E. The surface tension of mercury increases with temperature.

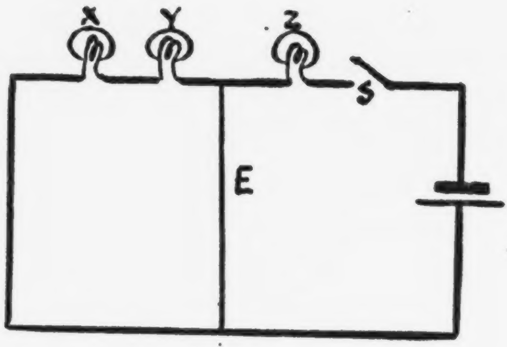
21. X, Y and Z represent three lamps in a circuit, which also includes a battery and a switch S. When the switch is open X fails to light while Y and Z do. Which of the following circuits is it?











22. Which of the following devices would not function on direct current?

A. Electromagnet.
B. Transformer.
C. Electric heating element.
D. Filament lamp bulb.
E. Electric bell.

23. Five different types of waves are: radiowaves, ultra-violet waves, infra-red waves, light waves, sound waves.

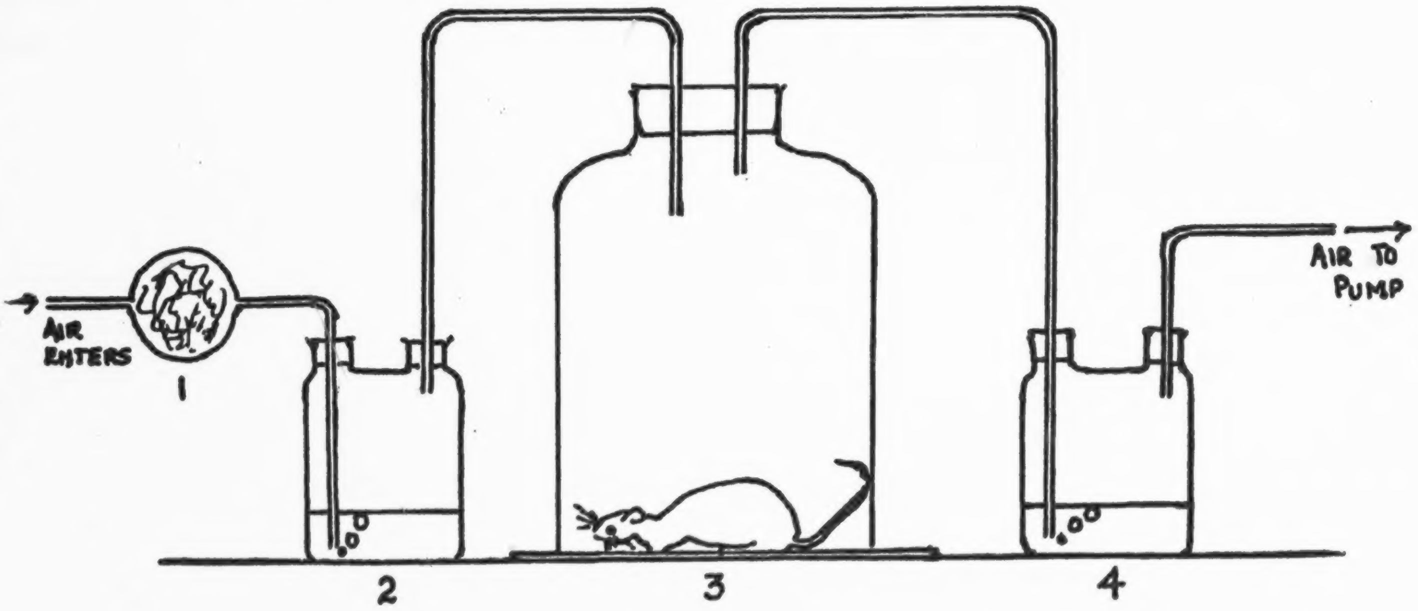
Each type of wave is different in some way from the other four. Which of the following is correct?

A. Radiowaves are the only waves which carry energy.
B. Ultra-violet waves are the only waves you cannot see.
C. Infra-red waves are the only transverse waves.
D. Light waves are the only waves which travel very fast.
E. Sound waves are the only longitudinal waves.

24. What fraction of the original mass of radio-active substance of half life 6 days is still undecayed after 12 days?

A. None of it.
B. $\frac{1}{36}$.
C. $\frac{1}{12}$.
D. $\frac{1}{4}$.
E. $\frac{1}{2}$.

Questions 25 and 26 refer to the following diagram which shows an arrangement of apparatus which can be used to show that an animal gives out carbon dioxide in respiration.



1 contains a substance which removes carbon dioxide from air, 2 and 4 both contain a liquid which changes in appearance when carbon dioxide passes through it.

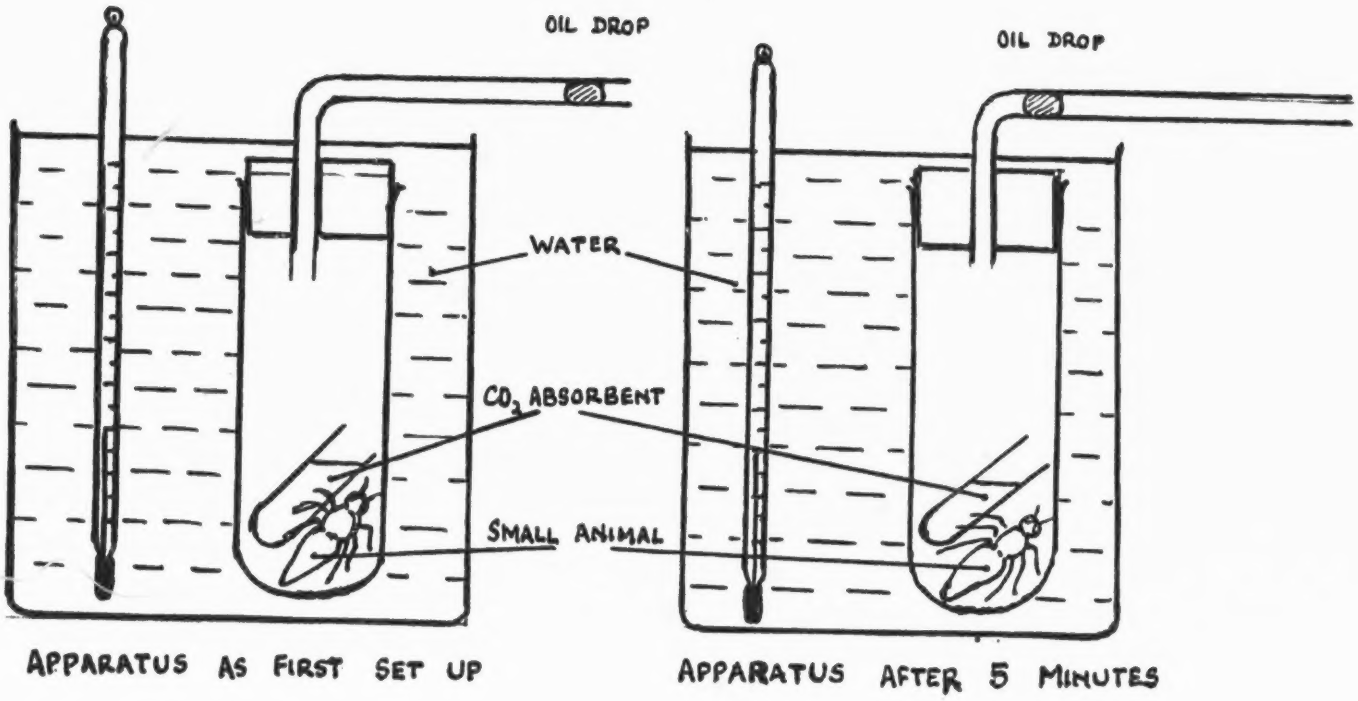
25. If air leaked into chamber 3, which one of the following effects would be seen?

A. The liquid in 4 would change more rapidly.
B. The rate of bubbling in 2 would slow down or stop.
C. The rate of bubbling in 4 would slow down or stop.
D. Liquid would pass from 4 into 3.
E. Air would pass from 3 into 2.

26. Which one of the following kinds of container for the animals would give the quickest result?

A. A small container.
B. A large container.
C. A container in a bright light.
D. A container covered with a dark cloth.
E. The size of the container would not matter.

Questions 27 and 28 refer to the following diagram:


OIL DROP
OIL DROP
WATER
CO_2 ABSORBENT
SMALL ANIMAL
APPARATUS AS FIRST SET UP
APPARATUS AFTER 5 MINUTES

Animals take in oxygen and give out carbon-dioxide.
Ordinary air contains very little carbon-dioxide.

27. Which of the following functions is measured with this apparatus?

    A. The rate of movement of the animal.
    B. The amount of heat produced by the animal.
    C. The rate of respiration of the animal.
    D. The effect of carbon-dioxide on the animal.
    E. The amount of carbon-dioxide absorbed by the animal.

28. Which of the following is true after 5 minutes?

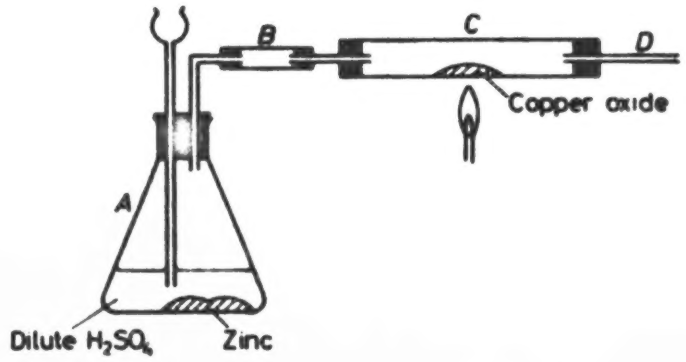
    A. The volume of air in the apparatus has increased.
    B. The volume of air in the apparatus has decreased.
    C. No change has taken place.
    D. No further movement of the oil drop can be expected.
    E. The oil drop will now begin to move in the other direction.

29. A chemist working for a toothpaste firm wishes to prepare 250 cm^3 of a 0.010 molar aqueous solution of stannous fluoride, SnF_2. Fortunately for him, SnF_2 is soluble in water. One mole of SnF_2 weighs 156.7 g. Equipment available includes a 250 cm^3 volumetric flask, a 10 cm^3 pipette, a 0.01 g sensitivity balance, and a 400 cm^3 beaker.

Once the proper amount of SnF_2 is weighed, which one of the following procedures would be best?

A. Place the SnF_2 in the beaker and add exactly 250 cm^3 of water from volumetric flask.
B. Place the SnF_2 in the beaker and add exactly 250 cm^3 of water from the pipette in 10 cm^3 portions.
C. Place the SnF_2 in the volumetric flask, dissolve it in less than 250 cm^3 of water, and then dilute to the 250 cm^3 mark.
D. Using the beaker and balance, weigh out exactly 250 g of water and add the SnF_2 to it.
E. Dissolve the SnF_2 in more than 250 cm^3 of water in the beaker mix thoroughly, and then fill the volumetric flask to the line with the solution.

30. The apparatus shown below is assembled to reduce copper (II) oxide with hydrogen gas.

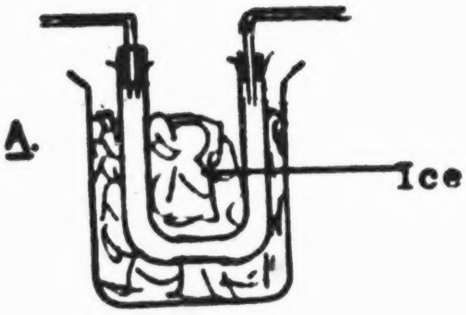


Hydrogen gas is produced in generator 'A' and is passed over hot copper (II) oxide in glass tube 'C'. Tiny droplets of water collect on the inside of tubes 'C' and 'D'. These droplets could possibly come from the generator 'A', being carried through into the rest of the apparatus by the stream of hydrogen. In order to test the truth of this explanation, it would be best to

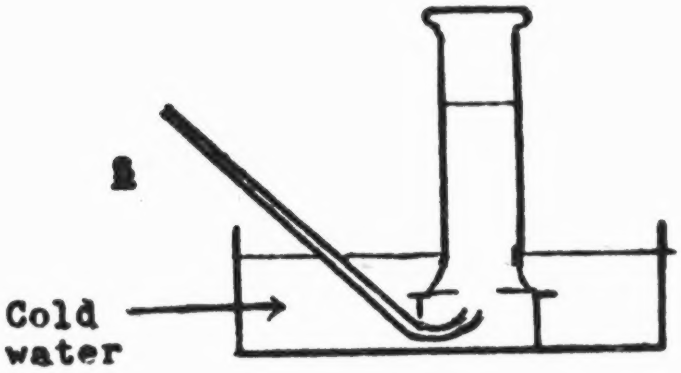
A. heat tube 'C' further
B. heat the generator 'A'
C. add a calcium chloride drying tube at the right of tube 'C'
D. add dry calcium chloride to tube 'B'
E. try to produce hydrogen by the reaction of zinc with a different acid.

31.

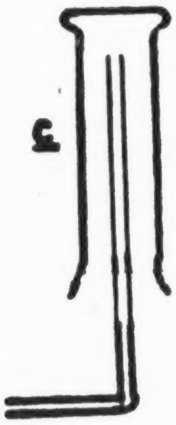
A.



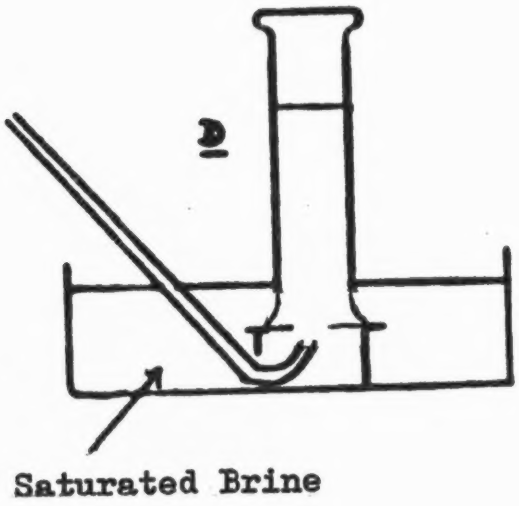
B



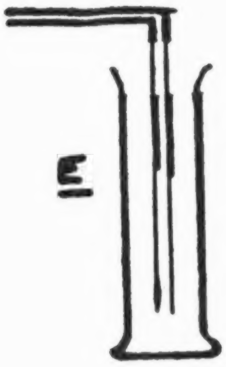
C



D


Saturated Brine

E



Which of the apparatus assemblies shown above would be the most suitable one with which to collect, in a pure state, a gas which is denser than air, soluble in water and has a boiling point of 21°C?

32. The following apparatus is set out on the laboratory bench: two vacuum (thermos) flasks, two thermometers, two measuring cylinders, a beaker containing 1 M sodium hydroxide solution and a beaker containing 1 M hydrochloric acid.

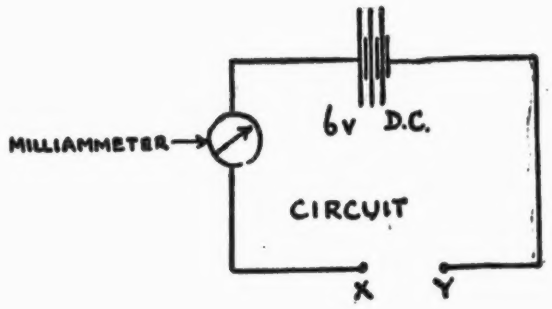
Which one of the following procedures would give most accurately a value for the molar heat evolved in the neutralization of sodium hydroxide and hydrochloric acid?

A. Take the temperatures of the acid and alkali in their respective beakers, mix them into a vacuum flask and record the rise in temperature produced.
B. Mix the acid and alkali in one vacuum flask, record the temperature, transfer the contents to the second flask and record any change in temperature.
C. Allow all the acid and half the volume of alkali to come to steady recorded temperatures in the respective vacuum flasks, mix them and record the temperature rise produced.
D. Allow equal volumes of acid and alkali to come to steady recorded temperatures in the respective vacuum flasks, mix them and record the temperature rise produced.
E. With a known volume of acid in the one vacuum flask record the temperature at regular intervals of time as a known volume of acid is added from the other flask.

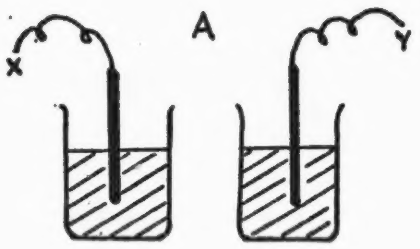
33. A number of different solutions have to be tested to find out whether or not they will each conduct electricity and, if so, what products are liberated.

Using the circuit shown below, which of the following pieces of apparatus would be most suitable when connected between points X and Y?

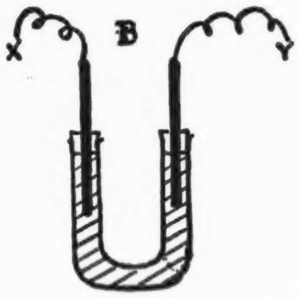
(All the beakers and tubes are made of glass, the electrodes of carbon, and solutions are shown shaded.)



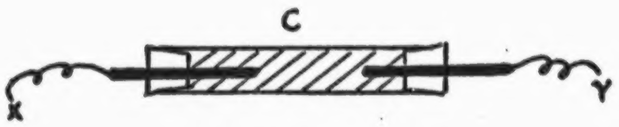
A



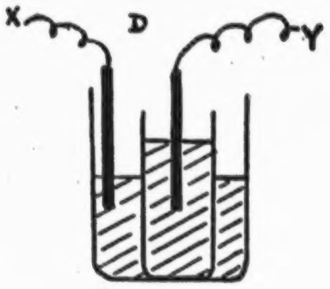
B



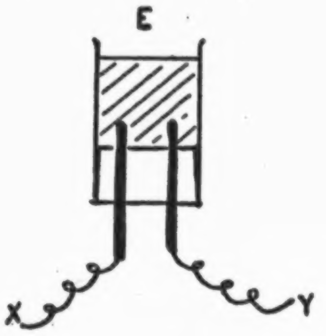
C



D

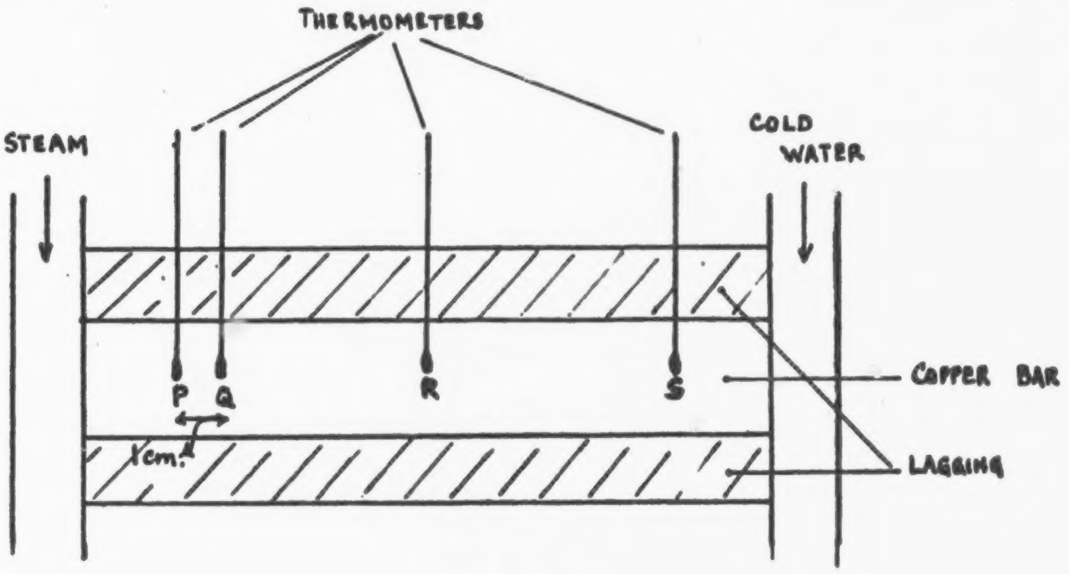


E



Answer here: A B C D E

34. One end of a well-lagged copper bar is heated and the other kept cold. The temperature at different points on the bar can be read by thermometers dipping into small holes at P,Q,R and S.



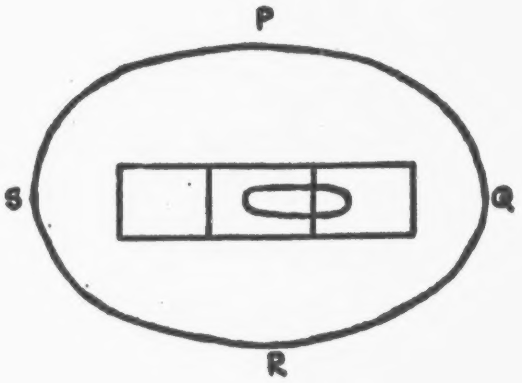
The temperature falls uniformly along the bar, and it is required to find the temperature gradient, or fall in temperature for unit length.

The two thermometers to be read should be placed at

A. P and Q
B. P and R
C. P and S
D. Q and R
E. R and S

35. A spirit level is placed on the top of a table and viewed from above when it appears as shown in the diagram. Which of the points P, Q, R and S should be raised as a first step towards making the table level?

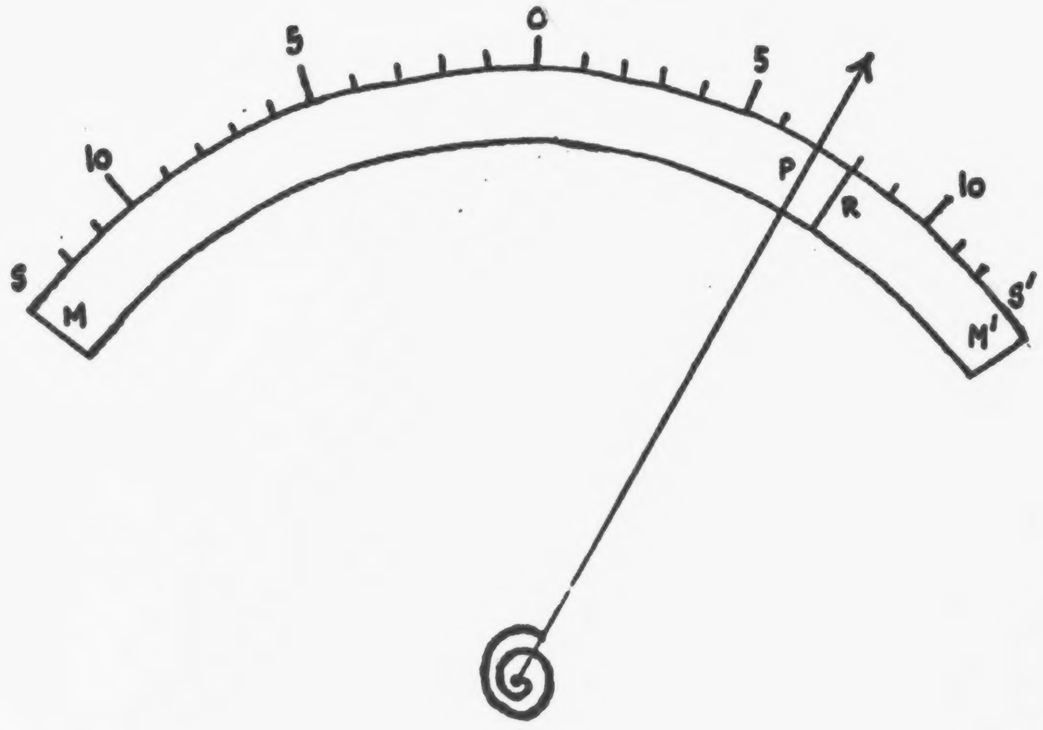
A. P
B. Q
C. R
D. S
E. Q and S together



36. A meter has a pointer P which moves over a strip mirror MM' and a scale SS'. When photographed the meter appears as shown, where R is the reflection of the pointer in the mirror.

What is the meter reading?

A. Between 6 and 7 units
B. 7 units
C. Between 7 and 8 units
D. 8 units
E. Between 8 and 9 units



END OF BOOKLET 10

I. E. A.

IEA/11 B
(P - U)

BOOKLET 11 B (P - U)

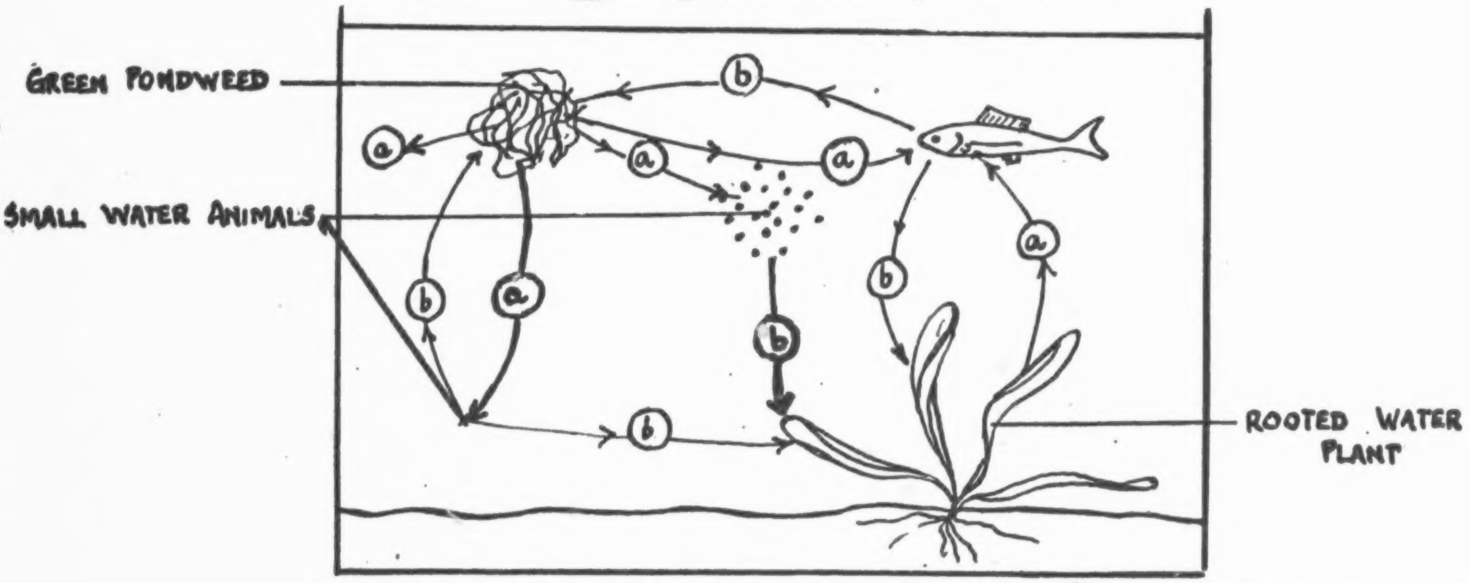
SCIENCE

SECTION B

1. The energy for photosynthesis is obtained from

   A. chlorophyll.
   B. chloroplasts.
   C. sunlight.
   D. carbohydrates.
   E. carbon dioxide.

2. The diagram below shows an example of interdependence among aquatic organisms. During the day the organisms either use up or give off ⓐ or ⓑ as shown by the arrows.



Choose the right answer for ⓐ and ⓑ from the alternatives given

   A. a is oxygen and b is carbon dioxide.
   B. a is oxygen and b is carbohydrate.
   C. a is nitrogen and b is carbon dioxide.
   D. a is carbon dioxide and b is oxygen.
   E. a is carbon dioxide and b is carbohydrate.

3. Mushrooms can be grown in the dark because they

   A. are then in a constant temperature.
   B. can then form more vitamins.
   C. need not be pollinated by bees.
   D. feed on decaying material.
   E. do not produce seeds.

4. A person wanted to determine whether bile aided in the digestion of fats. He found that whenever he mixed pancreatic juice with fats a small amount of the fat was digested. But whenever he mixed pancreatic juice and bile with fat, he found that the fat was completely digested. When he mixed bile alone with fat, he found that there was no digestion.

He interpreted this as showing that bile aided in the digestion of fats.

Which of the following statements best describes this interpretation?

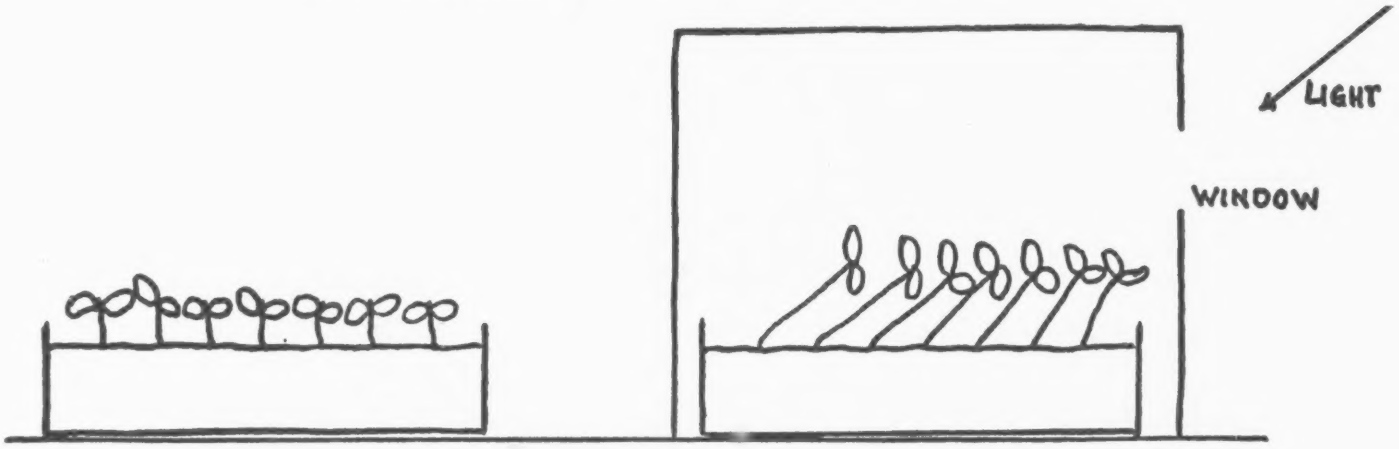
The interpretation is

A. justified.
B. unjustified because it does not answer the question.
C. unjustified because the experiment lacks a control.
D. unjustified because the data are inadequate.
E. unjustified because it is contradicted by the data.

5. Why is it that your body temperature does not fall even though you lose heat continually?

A. The blood distributes heat round the body.
B. Respiration results in the liberation of heat.
C. Heat is constantly being absorbed from the sun.
D. Hot meals are eaten regularly.
E. Warm clothes are good insulators.

6. Two boxes of soil were sown with the same kind of seeds and placed side by side in a greenhouse. One was covered with a light-tight box which had a small "window" cut in one side The drawings show the appearance of the seedlings after a few days.



What is the best conclusion from this experiment?

A. The seedlings grow quicker if they are stimulated by light.
B. Seedlings grow towards the light.
C. Seedlings grow quicker in subdued light and they bend towards the light.
D. Seedlings illuminated on one side bend towards that side.
E. Light slows down the rate of growth of that part of the stem on which it falls.

7. Fossils very similar in shape to marine shellfish which live in oceans today have been found in the rocks of high mountains. The most likely explanation of this is that

   A. the marine shellfish in question can live in the sea or on land.
   B. marine forms once had organs that enabled them to breathe atmospheric air.
   C. the rocks in which the fossils were found were formed under the sea.
   D. marine forms, in certain cases, migrate on to the land.
   E. marine forms have evolved from land forms.

8. You can be reasonable certain that organs in two different animals are homologous and not merely analogous if both organs

   A. fulfill similar functions but have different names.
   B. excrete metabolic waste.
   C. are used for locomotion.
   D. are called by the same name.
   E. originate from the same part of the embryo.

9. When alcohol is burned in air, water is formed. Another product of the the combustion is a gas which turns lime water cloudy. Consider the following three statements with regard to these two facts.

   Statements.
   I. Carbon is a constituent element of alcohol.
   II. Hydrogen is a constituent element of alcohol.
   III. Oxygen is a constituent element of alcohol.

   Which statement or combination of these statements can be deduced from the evidence given?

   A. I and II.
   B. I, II and III.
   C. I and III.
   D. II and III.
   E. I only.

10. Zinc strips are inserted into each of four beakers containing four different liquids. Each beaker is identified by a single Roman numeral.

The following observations were made.

Beaker	Initial Observation	Conductivity before zinc is added
I	no visible reaction	very poor
II	bubbles of a colourless gas form on the zinc strip	good
III	a reddish-brown gas is evolved from the surface of the zinc strip	good
IV	no visible reaction	very poor

On the basis of the evidence given which of the following is a reasonable conclusion?

A. Beakers I and IV contain aqueous solutions of strong acids.
B. Beaker II could contain an aqueous acid.
C. Beaker III could not contain an aqueous acid.
D. Beaker III must contain sulphuric acid, H_2SO_4.
E. Beakers I and IV contain alkalies.

11. Why will a pile of grain burn only very slowly whereas flou dust suspended in air is explosive?

A. The heat produced when small particles burn is greater.
B. Grinding the grain changes its composition.
C. Small particles have greater surface area in contact with air.
D. Small particles posess more energy than large particles.
E. The coat of the grain does not burn.

12. On a new temperature scale, graduated in degrees N, the reading 0°N corresponds to 0° K and the reading 100° N corresponds to 273° K (the freezing point of water).

    If the temperature of a sample of 100 cm^3 of gas were changed from 50°N to 49°N, at constant pressure, its volume would

    A. increase to 101 cm^3.
    B. decrease to 99 cm^3.
    C. increase to 102 cm^3.
    D. decrease to 98 cm^3.
    E. remain constant.

13. A 15.0 millilitre sample of a 1.00 molar solution of HCl will exactly neutralize 7.5 millilitres of a 1.00 molar solution of

    A. $(NH_4)_2CO_3$.

    B. KOH.

    C. C_2H_5OH.

    D. $Ba(OH)_2$.

    E. $MgCl_2$.

14. Chemical equilibrium occurs only when

    A. all components stop reacting.
    B. the substances initially present have now reacted completely.
    C. the substances start reacting.
    D. the components decompose at the same rate as they are formed
    E. the concentrations of all the components become equal.

15. Some N_2, H_2, and NH_3 reach equilibrium in a stainless steel container at 500°C.

    The equilibrium is symbolised by the equation

    $3\ H_2 + N_2 \rightleftharpoons 2\ NH_3 + \text{heat}$ (i.e. reaction to the right is exothermic)

    What will be the effect of an increased concentration of hydrogen?

    A. There is a decreased yield of ammonia.
    B. The equilibrium concentrations are unaffected.
    C. There is an increased yield of ammonia.
    D. There is a corresponding rise in temperature.
    E. Both C and D are correct.

16. Which of the following does not consist mainly of carbon atoms?

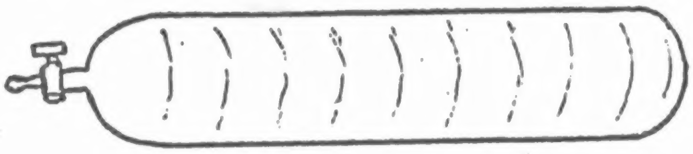
A. Diamond.
B. Graphite.
C. Soot.
D. Ruby.
E. Charcoal.

17. A hydrocarbon is found to contain carbon and hydrogen atoms in the ratio 1 : 2 and to have a molecular weight about 28. Which of the following is the most likely molecular formula of the compound

A. CH_2 .
B. CH_2N.
C. C_2H_4.
D. C_3H_6N.
E. C_4H_8.

Atomic weights: H = 1, C = 12, N = 14.

18. An iron container is evacuated and weighed. It is then filled with hydrogen gas and weighed again.



The weight of the container full of hydrogen compared to the weight of the evacuated container is

A. less.
B. greater.
C. the same.
D. greater or less depending on the volume of the gas in the container.
E. greater or less depending on the temperature of the gas in the container.

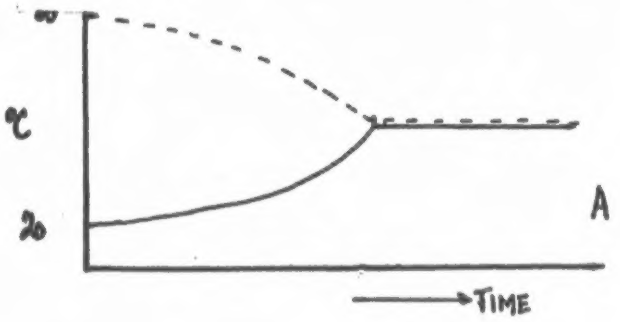
19. A certain force was needed to keep a trolley moving along a horizontal surface at a uniform velocity because the trolley had

A. inertia.
B. weight.
C. friction forces equal to this force.
D. friction forces just less than this force.
E. mass.

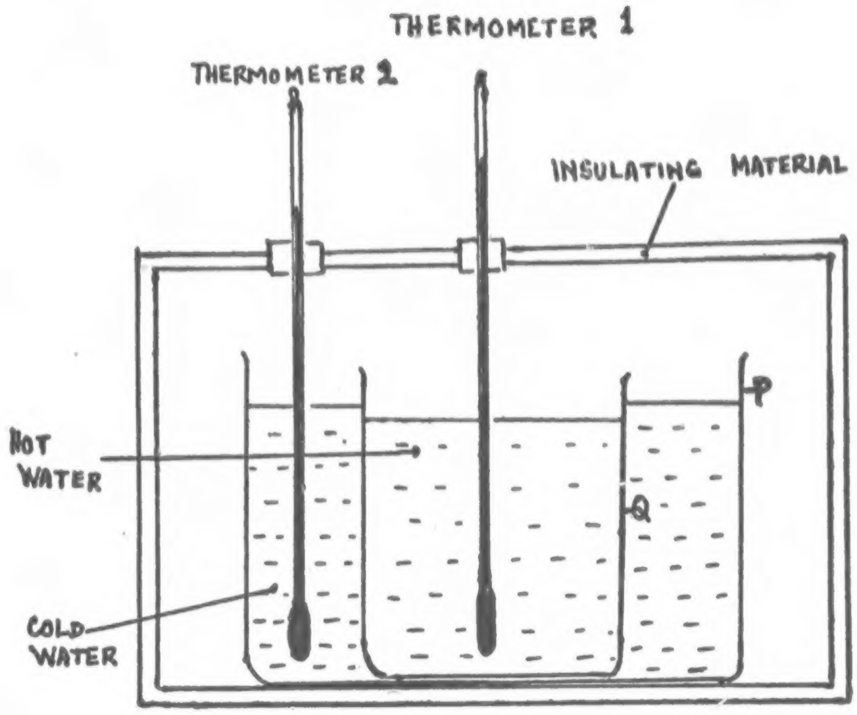
20. A stone is thrown upward at an angle of 45°. At the highest point reached by the stone its

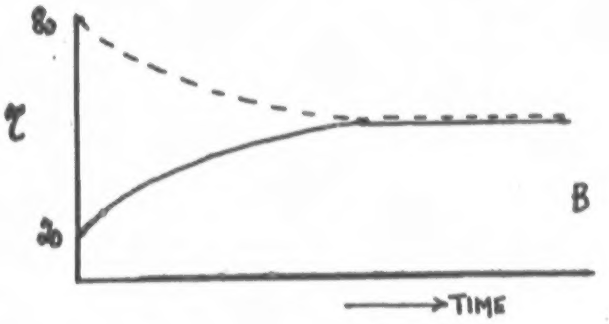
    A. acceleration is zero.
    B. acceleration is at a minimum, but not zero.
    C. total energy is at a maximum.
    D. potential energy is at a minimum.
    E. kinetic energy is at a minimum.

21. After 100 g of water at 20° C was poured into the container P, 100 g of water at 80° C was poured into the beaker Q. The temperatures of the water in the two vessels were measured after equal intervals of time. Which of the following graphs best represents the changes in the temperatures of the water in the two vessels?

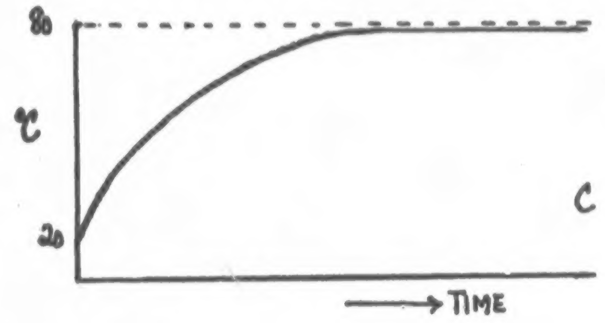


A

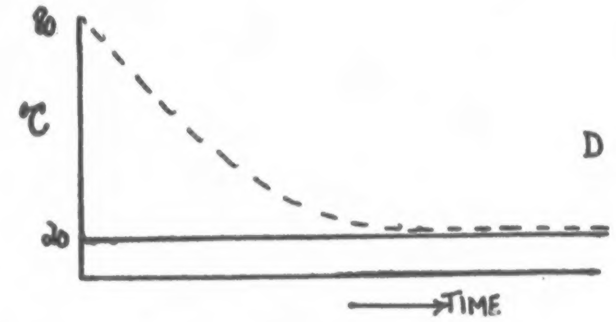

THERMOMETER 1
THERMOMETER 2
INSULATING MATERIAL
P
HOT WATER
Q
COLD WATER



B



C



D

╌╌╌╌╌╌╌╌ THERMOMETER 1

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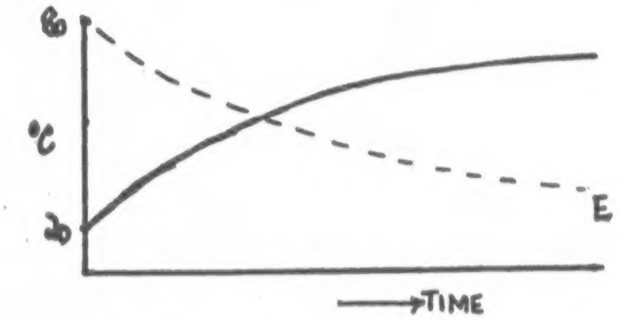


E

22. A one-ton truck coasts from rest down an incline of a vertical height of 30 metres and is breaked to a stop at the bottom. Air friction is negligible. In order to estimate the quantity of heat produced what additional information is required?

    A. The length of the incline.
    B. The length and slope (gradient) of the incline.
    C. The rise in temperature of the brake surfaces.
    D. The average speed of the truck.
    E. None of the information in statements A to D required.

23. An instrument sounds pitch C outdoors in the cold. What will be the pitch of the sound as heard by a man standing in a warm room?

    A. The note will seem higher in pitch than C.
    B. The note will seem lower in pitch than C.
    C. The note will sound in the pitch of C.
    D. Any of the above, depending on the difference in temperature.
    E. Any of the above, depending on the amplitude of sound.

24. By which of the following methods can geological time be measured most accurately?

    A. Size of fossils.
    B. Thicknesses of sedimentary layers.
    C. Radioactivity of uranium.
    D. Rate of salt accumulation in the ocean.
    E. Temperatures in the mantle.

National Centers : Set P or Q or R or S or T or U to be entered here.

TEST 11 B

SET P

SCIENCE - TEST 11B Set P

25. What fills the space between the cell wall and the protoplast when a plant cell is plasmolyzed with a salt solution?

A. Water.
B. Air.
C. Salt solution.
D. Ectoplasm.
E. Cell sap.

26. In order to obtain two crops in one growing season a farmer planted some seeds which he had harvested the previous week, but the seeds failed to germinate. What can be concluded from this observation?

A. The farmer did not provide the right conditions for germination.
B. The seeds needed a longer period of maturation.
C. The farmer had not removed inhibiting substances.
D. The seeds required a period of low temperature.
E. The data are inadequate for a conclusion to be reached.

27. What is the change in oxidation number (oxidation state : valency) of manganese in the reaction represented by the equation

$$MnO_2 + 4\ HCl \longrightarrow MnCl_2 + Cl_2 + 2\ H_2O$$

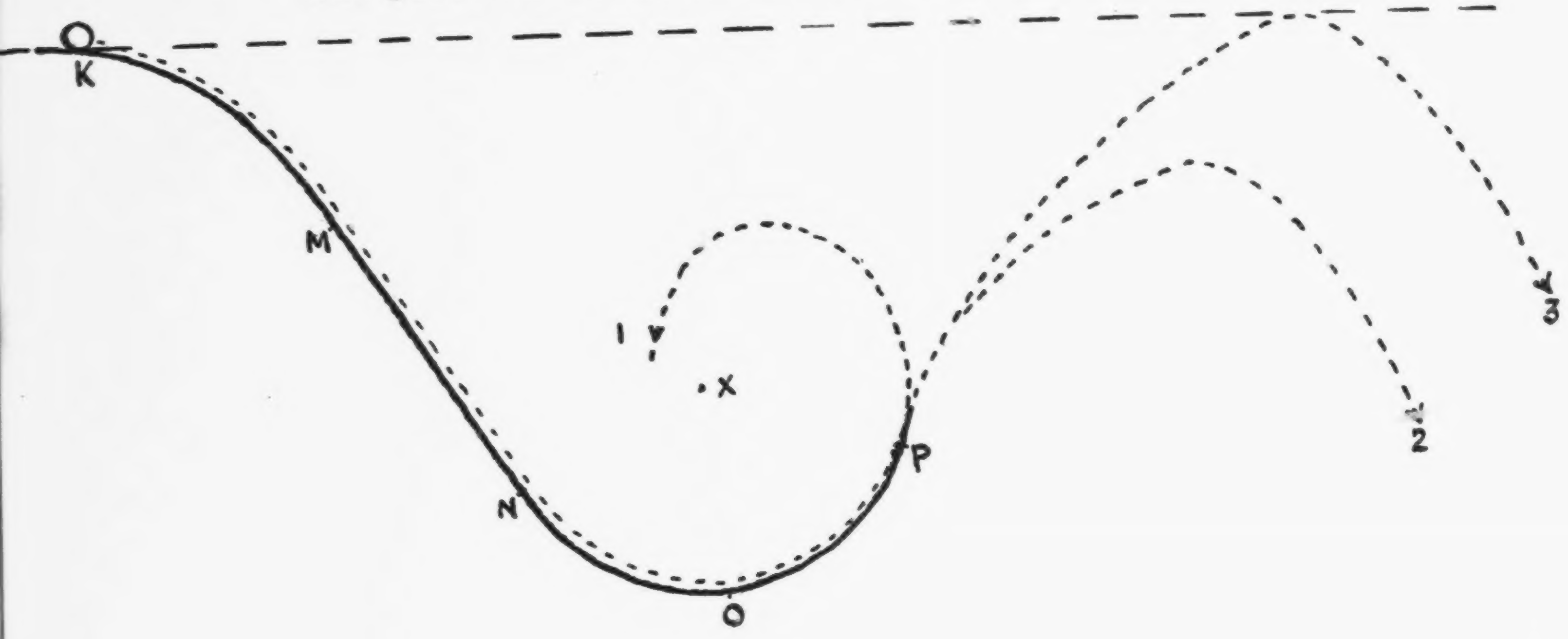
A. 2.
B. 3.
C. 4.
D. 5.
E. 6.

28. Selenium is the element below sulphur in the periodic table. One would expect selenium to

A. be a metal with a high boiling point.
B. form a potassium oxy-salt of formula K_3SeO_4.
C. burn in air to form an oxide SeO.
D. dissolve in nitric acid to form a salt $Se(NO_3)_4$.
E. form a compound H_2Se which is weakly acidic in aqueous solution.

4

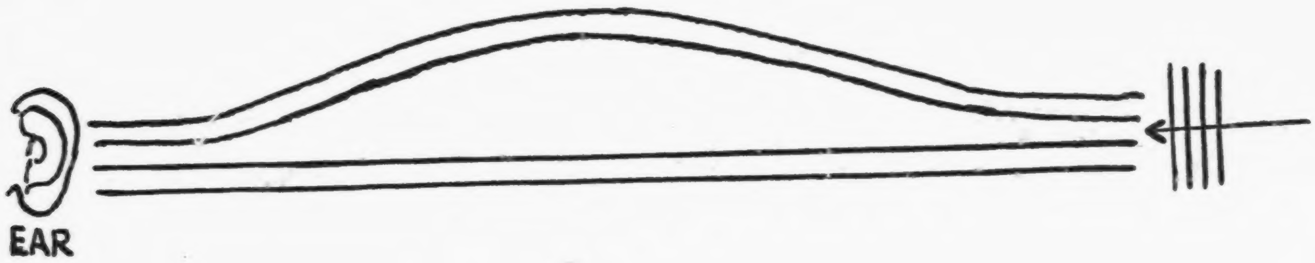
29. A ball was released at the position K on the rail shown in the figure. On the rail the part MN is a straight line, and the part N O P is a circular arc with its center at X. The ball moved along the rail and then went off from the rail at the position P, which is lower than X.



Assuming that the friction between the ball and the rail, the rotation of the ball and the air resistance are all negligible, which one of the alternatives is correct?

A. The ball moved as shown in the curve 1 in the figure running off from the circular path owing to the gravitation.
B. As there is not any resistance, it reached the same height as the point K, but that actual path cannot be determined.
C. As the mechanical energy of the ball changed owing to contact with the rail, it did not reach quite the same height as the point K.
D. As the direction of the ball going off from the point P is inclined to the vertical, it moved as shown in the curve 2 in the figure.
E. As the mechanical energy is conserved, it moved as the curve 3 in the figure.

30. Sound waves 1 m. in length are carried to a man's ear by two rubber tubes. With which of the following combinations of tube-lengths will the man hear no sound?



A. $\frac{3}{4}$ m., $1\frac{3}{4}$ m.
B. $\frac{3}{4}$ m., $2\frac{1}{4}$ m.
C. 1 m., $2\frac{3}{4}$ m.
D. $1\frac{1}{2}$ m., $2\frac{3}{4}$ m.
E. 2 m., 4 m.

TEST 11 B

SET Q

SCIENCE - Test 11B Set Q

25. In many breeds of cattle the polled condition (absence of horns) is dominant over the presence of horns, and homozygous red crossed with homozygous white produces roan (intermingled red and white hairs) colour. Which of the following crosses will produce only horned roan offspring?

A. Polled red x horned white.
B. Horned roan x horned roan.
C. Horned red x horned white.
D. Polled roan x horned roan.
E. Polled white x horned roan.

26. Which of the following does NOT provide evidence of evolution?

A. Green plants can be arranged in order from simple to complex.
B. Embryos of birds, reptiles, and mammals have gill clefts resembling those of a fish embryo.
C. The ancestry of animals like the horse can be traced through the fossil record.
D. The caecum is present in all mammals including man but is only functional in some.
E. The individuals within a species differ considerably one from another.

27. In the periodic table group beginning with nitrogen, how do metallic characteristics change with increasing atomic weight?

A. The metallic characteristics increase.
B. The metallic characteristics decrease and the heaviest element in the group is non-metallic.
C. The metallic characteristic does not change.
D. The metallic characteristic becomes strong or weak periodically not by groups.
E. We cannot tell because the periodic table gives no guide to metallic or non-metallic character.

28. When a small speck of lead monoxide was added to a concentrated solution of hydrogen peroxide, the solution became hot and eventually erupted violently. In this process large amounts of oxygen were given off. Which of the following is the best explanation?

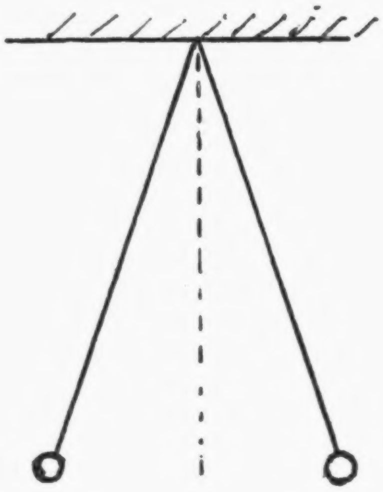
A. The great amount of heat is due to the release of oxygen by the decomposition of lead monoxide; no catalysis is involved.
B. The reaction is catalysed by lead monoxide but unaffected by a rise in temperature.
C. The reaction is not catalysed by lead monoxide but is accelerated by a rise in temperature.
D. The reaction is unaffected by a rise in temperature but catalysed by products.
E. The reaction is catalysed by lead monoxide and accelerated by a rise in temperature.

29. Sound is not an electromagnetic radiation. The best evidence for the truth of this statement is the fact that

A. audible sounds have a wavelength (in air) of about 1 m (about middle E).
B. diffraction effects can be observed.
C sound can be produced by vibrating solids.
D. sound travels at 300 m/s in air.
E. sound can be refracted.

30. Two electrically charged spheres are suspended from the same point by insulating threads of equal length and repel each other so that the threads make equal angles with the vertical. What can be said of the balls?

A. Their masses and charges are equal.
B. Their masses are equal, the charges may or may not be.
C. Their charges are equal, the masses may or may not be.
D. The ratio of charge to mass is the same for both.
E. The repulsive force on each must be equal to its weight.



TEST 11 B

SET R

SCIENCE - TEST 11B Set R

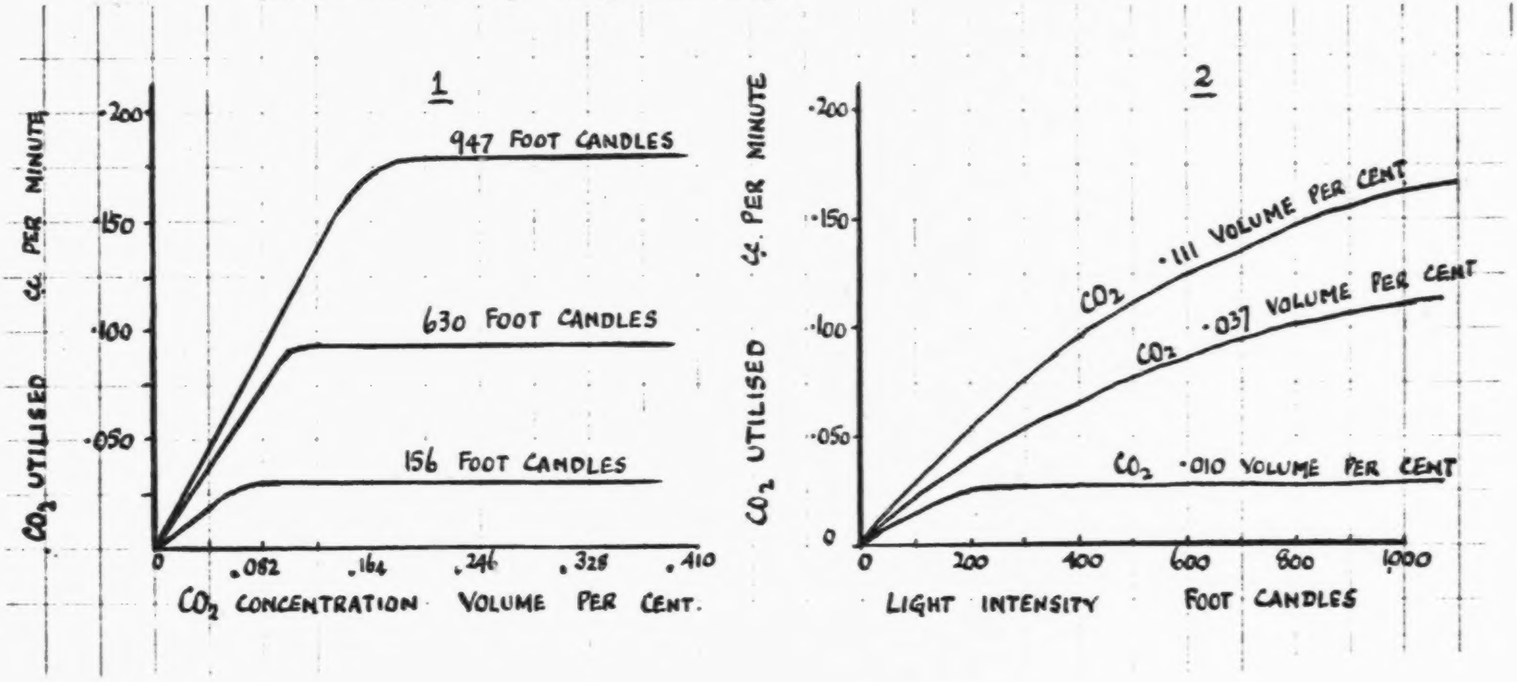
25. What is the minimum weight of NaCl that is needed to prepare 7.1 g of chlorine? (Approximate atomic weights: Na= 23, Cl= 35.5).

A. 5.9 g.
B. 7.1 g.
C. 11.7 g.
D. 12.7 g.
E. 14.2 g.

26. On the basis of the periodic table, which of the following would be described best as an oxide which is only basic?

A. Al_2O_3.
B. CO.
C. P_2O_5.
D. NO_2.
E. CaO.

27. The graphs show the relationships between the carbon-dioxide (CO_2) utilisation by wheat plants and the carbon-dioxide concentration (volume per cent) in the outside air and the light intensity (foot candles) respectively.



It has been stated that the data shown in fig. 2 indicate that, of light intensity and carbon-dioxide concentration, the factor which limits carbon-dioxide utilisation and thus photosynthesis, is the concentration of carbon-dioxide present in the air.

A. The statement is true according to the graph.
B. The statement is false according to the graph.
C. The statement cannot be judged by the graph but is in accord with an established biological principle.
D. The statement cannot be judged by the graph and is not in accord with an established biological principle.
E. The statement cannot be judged by the graph or by an established biological principle.

28. Someone proposes to drive an electric generator by means of an electric motor. The generator alone supplies the motor with current so that its frequency of rotation remains constant. It will not work because

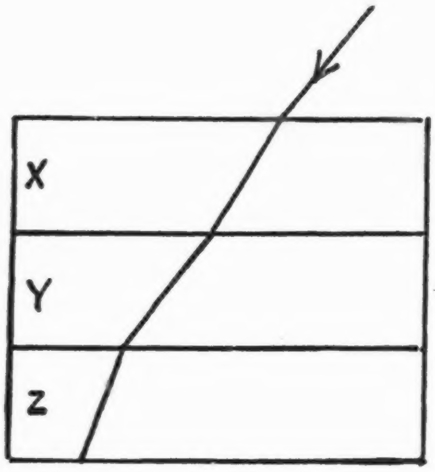
    A. more current is produced in the generator than the motor can use.
    B. of the direction of rotation.
    C. of the induced voltage.
    D. of the magnetic field.
    E. in the generator and motor, energy is always being transformed into heat.

29. In slightly diluted sea water, the small marine worm Gunda swells when deprived of oxygen and shrinks again when oxygen is supplied. What is the most likely explanation?

    A. Lack of oxygen results in an incomplete oxidation of waste products.
    B. The lack of oxygen increases water absorption.
    C. Excess water is poisonous to the organism.
    D. When less oxygen is available, there is not enough energy to oppose osmotic entry of water.
    E. An increase of surface area gives a better means of oxygen absorption.

30. A ray of blue light passes through a stack of three parallel-sided blocks made of different materials. The path of the beam is shown. In which of the three blocks is the velocity of blue light greatest?

    A. X.
    B. Y.
    C. Z.
    D. The velocity is the same in all the blocks.
    E. The information given is insufficient to be able to say.

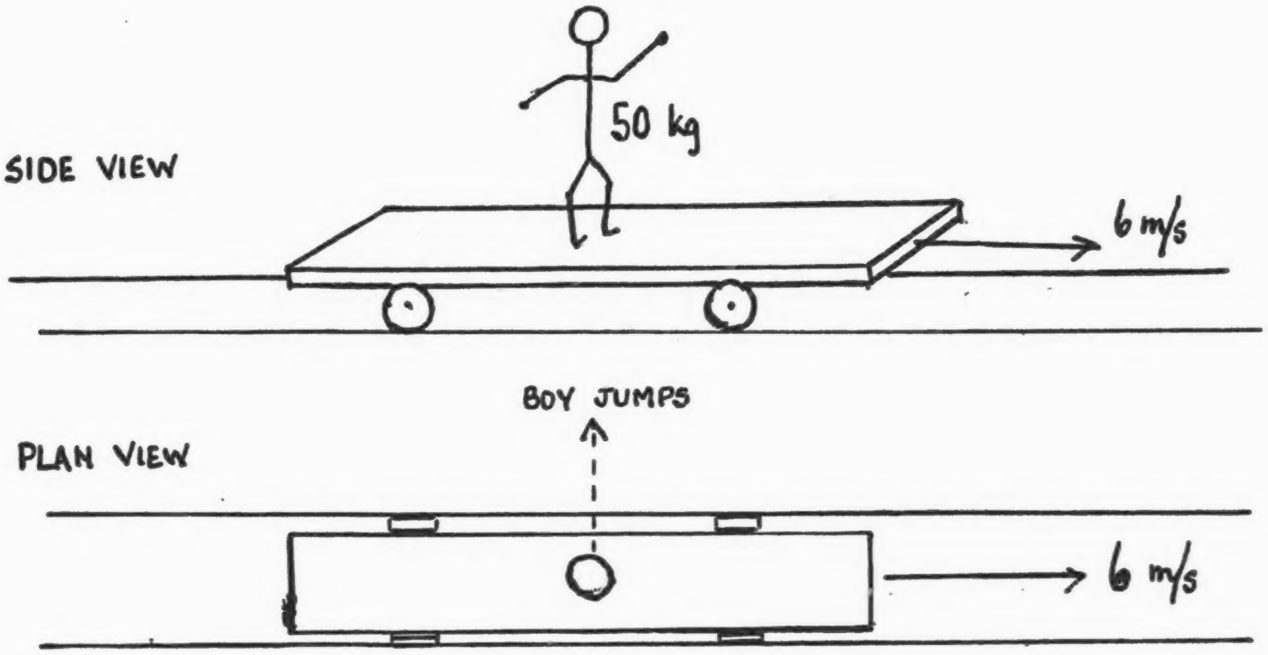


TEST 11 B

SET S

SCIENCE - TEST 11B Set S

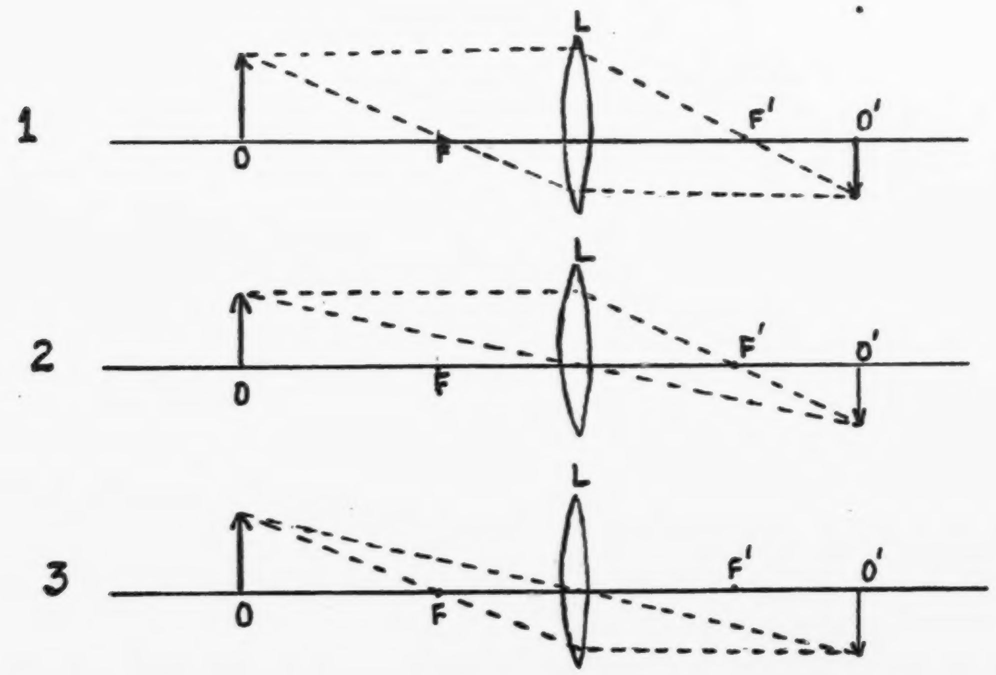
25. A 50 kg boy stands on a trolley of mass 100 kg. The trolley is travelling to the right on rails at a constant speed of 6 m/s.


SIDE VIEW
50 kg
6 m/s
BOY JUMPS
PLAN VIEW
6 m/s

After the boy jumps sideways off the trolley at right angles to it, the speed of the trolley is about

A. 3 m/s.
B. 4 m/s.
C. 6 m/s.
D. 9 m/s.
E. 12 m/s.

26. The three figures 1, 2, and 3 give the graphical construction for the image O' of the object O as produced by the thin lens L with foci F and F'.



Which, if any, of these three figures are correct?

A. Figures 2 and 3 are correct.
B. Figures 1 and 3 are correct.
C. Figures 1 and 2 are correct.
D. None of the figures are correct.
E. All three figures are correct.

27. The presence of ions in a water solution of a substance is most directly detected by

A. finding out if it conducts electricity.
B. measuring the density of the solution and comparing it with those of the pure solute and water.
C. seeing if the solution has an electric charge.
D. evaporating the solution and testing the residue for conductivity.
E. adding an ionic substance and seeing if there is a reaction.

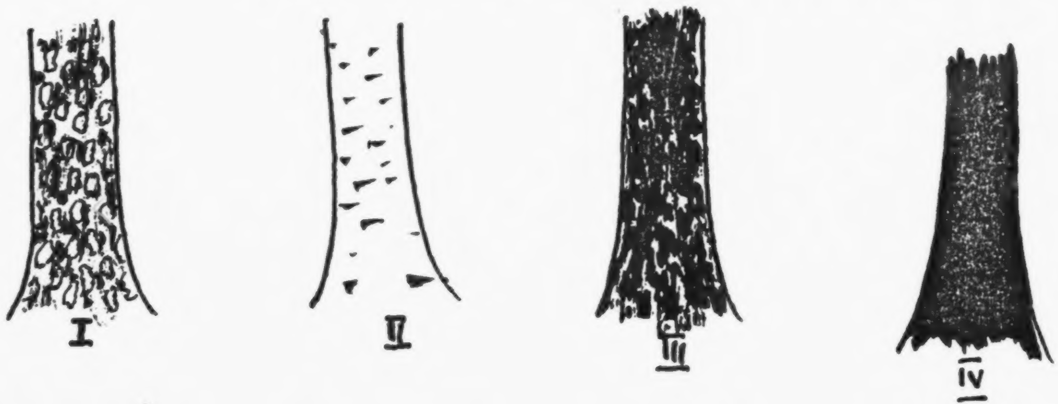
28. The electronegativity (electron attracting power) of a given element on Pauling's scale can be estimated from the electronegativities of the neighbouring elements in the periodic table. In estimating the electronegativity of chlorine from those of the elements to the left and right of it in period III, the determining factor is that, in going to the right in the period

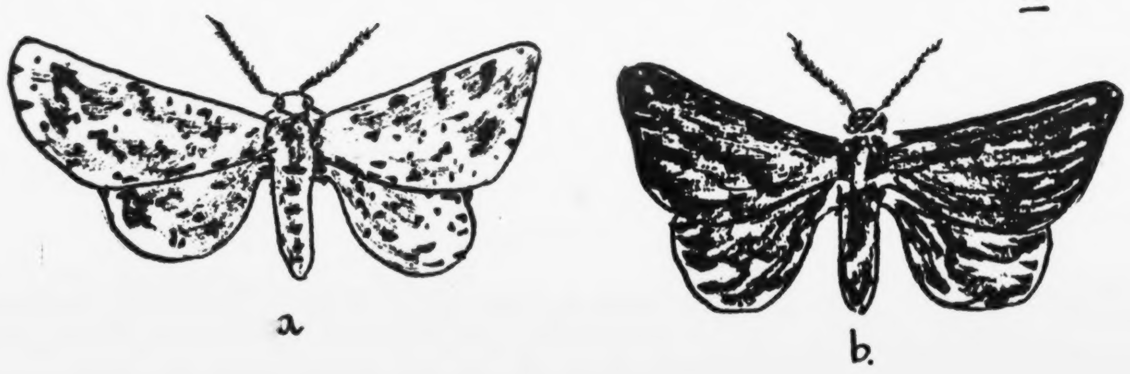
A. chemical reactivity decreases.
B. the number of filled energy levels per atom increases.
C. the van der Waals radius increases.
D. the density decreases.
E. the nuclear charge increases.

29. Drawings I to IV represent the trunks of trees:

I Light coloured trunk encrusted with lichens
II Light smooth trunk
III Dark rough trunk
IV Dark smooth trunk

a and b represent two forms of the same moth, a light speckled form and a predominantly dark, or melanic, form.



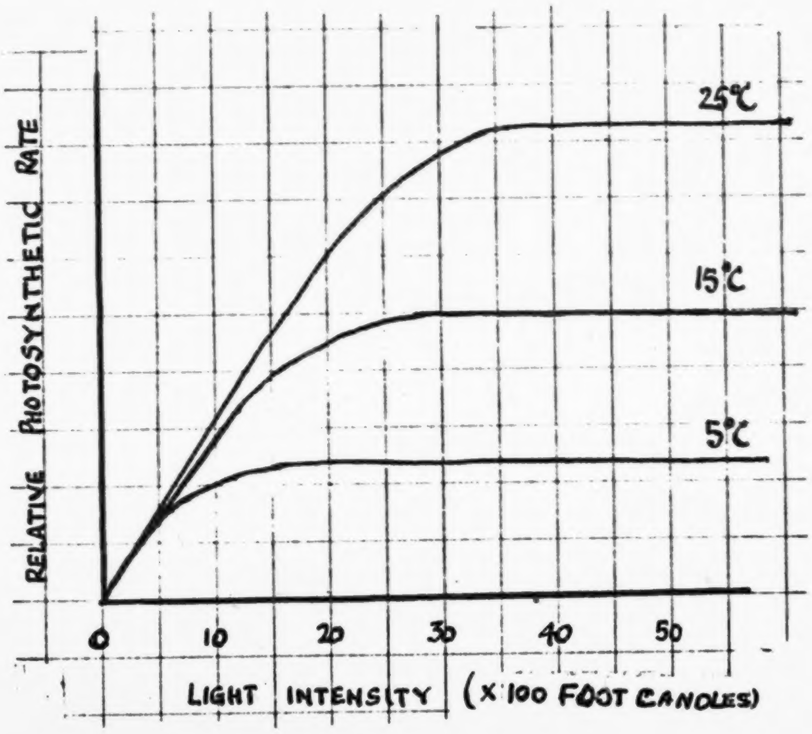


Until about 1850 the only form of this moth that had been recorded was that shown at a. Then the dark form shown at b was reported for the first time in woods close to what has since become a large industrial town. By the end of the 19th century, the dark form had become quite common and now it is, in many localities, the commoner of the two forms, especially in the vicinity of large towns, where it often comprises as much as 95% of the total population, although the light form predominates in areas away from large centres of population.

Which of the following best explains the appearance of the dark specimen in 1850?

A. The colour change was induced by air pollution.
B. The organisms adapted themselves to the change in external environment.
C. Air pollution affected the moths directly after their emergence from the pupal stage.
D. A mutation, that had occurred before but had failed to become established, became established because it was favoured by changed in the external environment.
E. The caterpillars ate soot contaminated leaves and dark moths developed from them.

30. In an experiment with a certain plant, the photosynthetic rate per unit of leaf area was measured at different light intensities. The experiment was repeated at three different temperatures, 5°C, 15°C and 25°C. An adequate supply of carbon-dioxide was maintained throughout the experiments. The graph shows the results.



What factor or factors determine the photosynthetic rate in light intensities more than 3,000 foot-candles?

A. Light intensity.
B. Temperature.
C. Temperature and light intensity.
D. Water status of plant.
E. The factor cannot be determined from the graph.

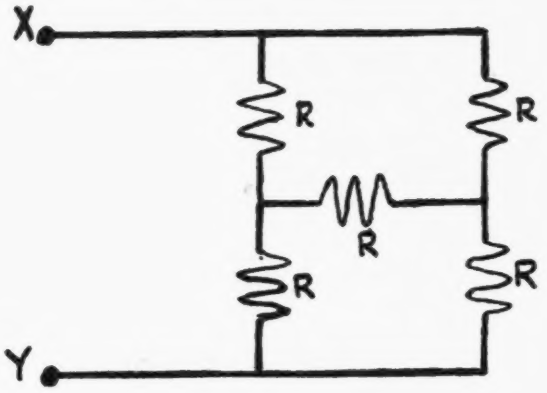
TEST 11 B

SET T

SCIENCE - TEST 11B Set T

25. Each resistor in the diagram has the same resistance R. What resistance will be measured between terminals X and Y?

A. 2R.
B. $\frac{4R}{3}$.
C. R.
D. $\frac{R}{2}$.
E. $\frac{R}{3}$.



26. A jar of oxygen gas and a jar of hydrogen gas are at the same temperature. The molecules of the gases have on average the same

A. velocity.
B. momentum.
C. force.
D. potential energy.
E. translational kinetic energy.

27. The rate of reaction of two substances X and Y is measured at several concentrations of X and Y as shown in the table.

Rate of reaction millimoles/litre second	12	36	24
Concentration of X moles/litre	5	15	10
Concentration of Y moles/litre	5	5	10

The rate of reaction is

A. proportional to the concentration of X but independent of the concentration of Y.
B. proportional to the concentration of X and Y.
C. proportional to the concentration of Y but independent of the concentration of X.
D. dependent on the concentrations of X and Y but not satisfactorily expressed in A, B or C.
E. dependent on some unspecified factors other than concentration.

28. Which of the following best describes the egg cell in the embryo sac of a plant?

A. It is formed by mitosis.
B. It gives rise to the endosperm.
C. It is analogous to a pollen grain.
D. It is a zygote.
E. It is a female gamete.

29. Which one of the following formulae represents a substance which you would NOT expect to exist under normal laboratory conditions?

A. NaH.
B. H_2S.
C. SiO_2.
D. $AlCl_2$.
E. O_3.

30. Drawings I to IV represent the trunks of trees:

I Light coloured trunk encrusted with lichens
II Light smooth trunk
III Dark rough trunk
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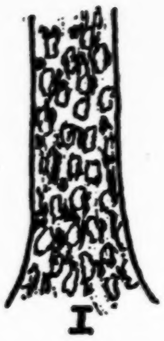
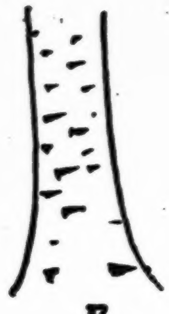
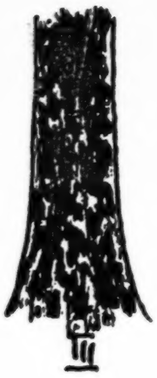
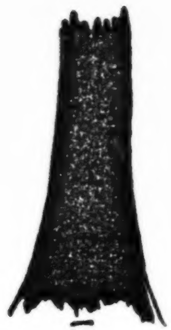
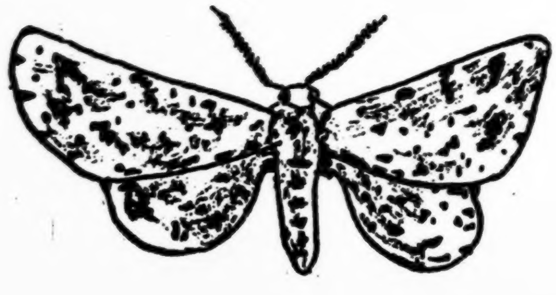
a and b represent two forms of the same moth, a light speckled form and a predominantly dark, or melanic, form.

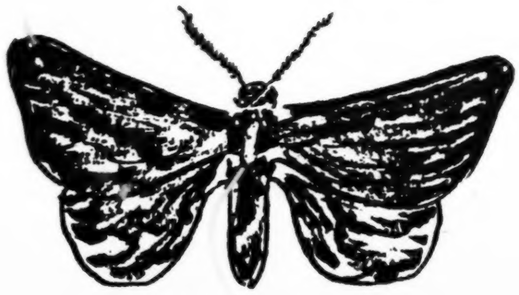

I


II


III


IV


a


b

Until about 1850 the only form of this moth that had been recorded was that shown a. Then the dark form shown at b was reported for the first time in woods close to what has since become a large industrial town. By the end of the 19th century, the dark form had become quite common and now it is, in many localities, the commoner of the two forms, especially in the vicinity of large towns, where it often comprises as much as 95% of the total population, although the light form predominates in areas away from large centres of population.

The paragraph describes a case of evolution through

A. sexual selection.
B. natural selection.
C. competition.
D. geographical isolation.
E. inheritance of acquired characters.

TEST 11 B

SET U

SCIENCE - TEST 11B Set U

25. If a photon collides with a free electron

A. energy is conserved; momentum is not.
B. momentum is conserved; energy is not.
C. both energy and momentum are conserved.
D. neither energy nor momentum need be conserved.
E. momentum is conserved; the nature of the collision determines whether energy is conserved.

26. If, in an imaginary situation, a 1 kg block of ice at 0°C is dropped from such a height that all of it is melted by the heat generated on impact with the ground, from what height would a 25 kg block of ice have to be dropped to melt completely, assuming that in both cases all of the heat is absorbed by the ice?

A. 25 times as high.
B. 5 times as high.
C. 1/5 as high.
D. 1/25 as high.
E. The same height.

27. A student wishes to see how temperature affects the solubility of a salt in water. His method is as follows:

He shakes an excess of the salt with water at a known temperature until no more appears to dissolve. He then filters to obtain a clear solution. After weighing a portion of this solution, he evaporates the water and weighs the dry salt. He then repeats the procedure at the same temperature as a check before proceeding to another temperature.

Which of the following is apt to cause the greatest error during determination of the solubility at a given temperature.

A. Allowing solution temperature to change prior to filtration.
B. Allowing solution temperature to change during evaporation.
C. Allowing solution temperature to change at any time during the procedure.
D. Not using the same size of salt crystals in the check determinations.
E. Not adding the same excess of salt in the check determinations.

28. The maintenance of a constant body temperature in man involves a balance between production of heat and loss of heat. Which of the factors given below least affects this balance?

A. The circulation of the blood.
B. Evaporation of water from the body surfaces.
C. Muscular contraction.
D. Dilation of blood vessels in the epidermis.
E. The heating of cold air in the lungs.

29. A compound X, of the formula C_3H_8O, on partial oxidation gives C_3H_6O. From this information, X is most likely to be

A. an alkanal (aldehyde).
B. a tertiary alkanol (alcohol).
C. an alkene (olefin).
D. a secondary alkanol (alcohol).
E. an ether

30. Some organisms are difficult to classify as plants or animals because they are

A. decomposers.
B. capable of acting as both producers and consumers.
C. microscopic and thus too difficult to study.
D. able to build up complex foods, by making use of light energy.
E. producers.

I. E. A.

IEA/15
IEA/16
IEA/17

SCIENCE

NATIONAL OPTIONS

POPULATION IVS

I. E. A.

IEA/15

BOOKLET 15

SCIENCE

BIOLOGY - BIO

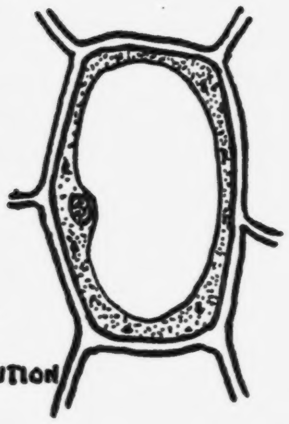
NATIONAL OPTION BIOLOGY

1. In which of the following mature cell types are nuclei typically present?

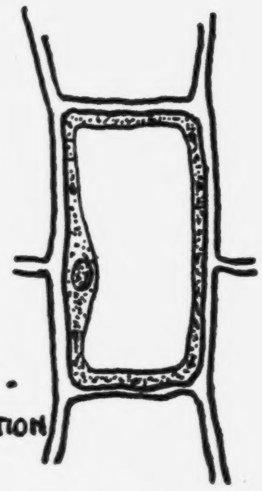
   A. Mammalian erythrocytes.
   B. Stomatal guard cells.
   C. Tracheids.
   D. Bacterial cells.
   E. Sieve tube elements.

Questions 2, 3,4 and 5 refer to the following statement and the accompanying diagrams.

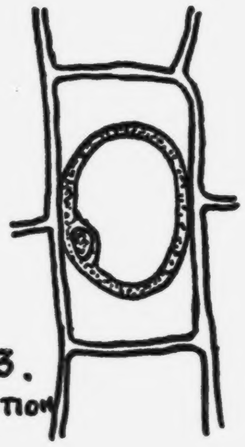
Similar fragments of a certain plant tissue were placed in 1%, 9% and 15% sugar solutions respectively. When viewed under the microscope after they had reached equilibrium with the bathing solution, single cells appeared as shown in the diagrams for the three solutions.



1. 1% SOLUTION



2. 9% SOLUTION



3. 15% SOLUTION

The differences shown in the three drawings are due to the [X] of the [Y]. Which of the following would you substitute for [X] and [Y] respectively?

2. For X
   A. Impermeability.
   B. Elasticity.
   C. Extensibility.
   D. Semi-permeability.
   E. Selectivity.

3. For Y
   A. Cell wall.
   B. Plasma membrane.
   C. Nuclear membrane.
   D. Vacuole.
   E. Bathing medium.

4. Which of the three cells shown has the highest turgor pressure?

   A. 1.
   B. 2.
   C. 3.
   D. It is the same for all three.
   E. It is impossible to say.

5. What fills the space between the cell wall and the protoplast when a plant cell is plasmolyzed with a salt solution?

   A. Water.
   B. Air.
   C. Salt solution.
   D. Ectoplasm.
   E. Cell sap.

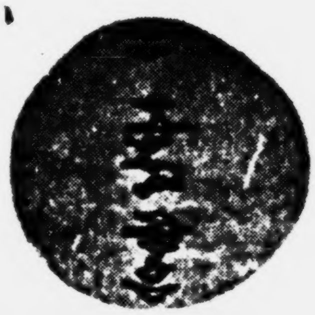
6. In a certain species each of two gene pairs is located on a different chromosome. For each pair, the gene may exist in either of its two allelic forms, one of which is completely dominant over the other. In which of the following crosses would all the offspring be of the same phenotype?

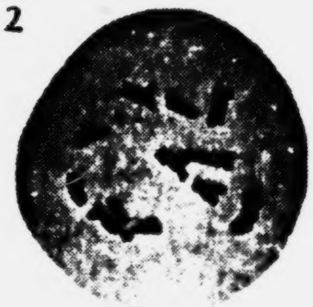
   A. Individuals both heterozygous for the two gene pairs.
   B. Individuals both heterozygous for one and the same gene pair, and homozygous recessive for the other pair.
   C. An individual heterozygous for both gene pairs, and an individual homozygous recessive for both pairs.
   D. An individual heterozygous for one gene pair and homozygous dominant for the other pair, and an individual homozygous recessive for both pairs.
   E. An individual homozygous dominant for both gene pairs and an individual heterozygous for both pairs.

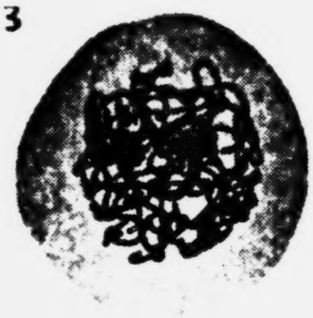
7. In many breeds of cattle the polled condition (absence of horns) is dominant over the presence of horns, and homozygous red crossed with homozygous white produces roan (intermingled red and white hairs) colour. Which of the following crosses will produce only horned roan offspring?

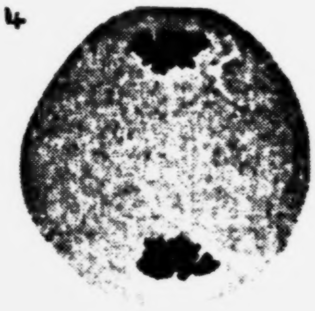
   A. Polled red x horned white.
   B. Horned roan x horned roan.
   C. Horned red x horned white.
   D. Polled roan x horned roan.
   E. Polled white x horned roan.

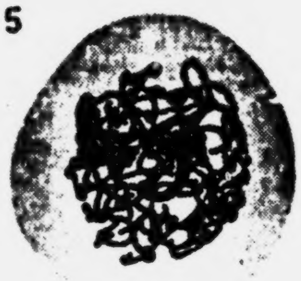
Items 8, 9 and 10 refer to the following photomicrographs of dividing cells from an anther taken from a flower bud, and stained to show chromosomes. Some of the stages are duplicated.

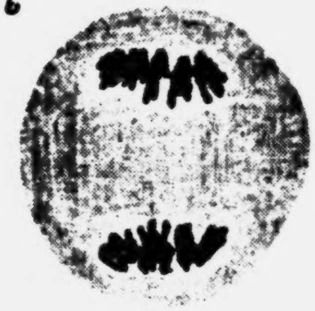
1


2


3


4


5


6


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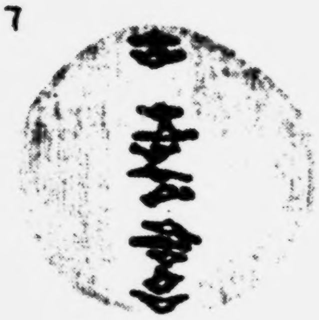
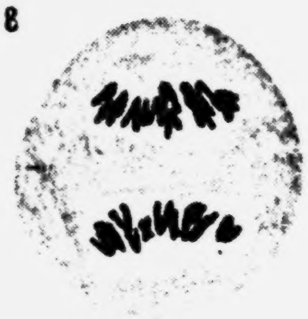
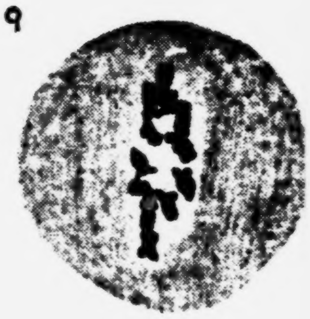
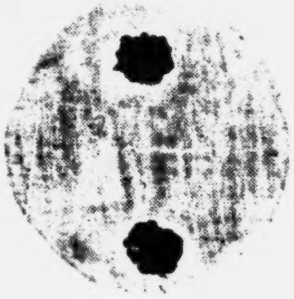
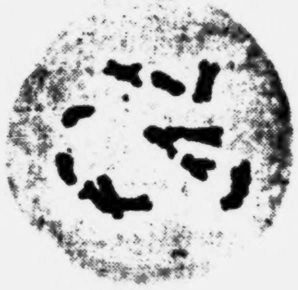
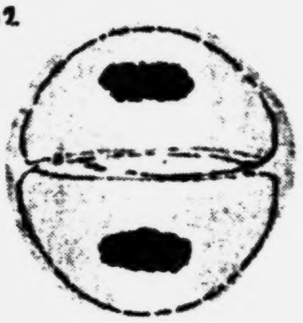


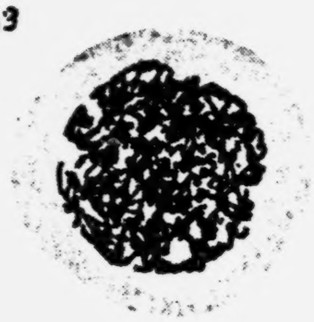
8


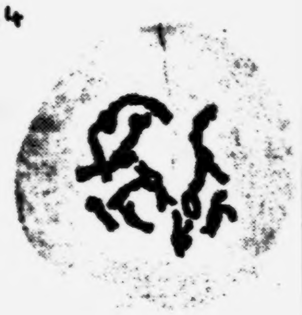
9


10


11


12


13


14


8. When the photomicrographs are arranged in the order in which the events they depict occur, which of the following processes do they illustrate?
   - A. Fusion of nuclei in fertilization.
   - B. Meiosis.
   - C. Mitosis.
   - D. Zygote formation.
   - E. Binary fission.

9. Number the photomicrographs in their most probable order and then select from the choices below the one that corresponds most nearly to yours. Bear in mind that some of the stages are duplicated.
   - A. 3, 4, 8, 9, 11, 12, 14, 7, 5, 6, 1.
   - B. 13, 5, 12, 4, 10, 6, 8, 7, 9, 2, 1.
   - C. 1, 7, 8, 6, 9, 14, 2, 3, 13, 5, 4.
   - D. 13, 5, 14, 11, 9, 1, 8, 6, 4, 10, 12.
   - E. 5, 10, 9, 8, 7, 11, 12, 13, 3, 2, 1.

10. What is the probable haploid number of chromosomes for this plant?

    A. 24.
    B. 10.
    C. 12.
    D. 6.
    E. 20.

11. All the offspring from a hooded/hooded x white/white cross in rats are found to be hooded. If these F_1 hooded rats are mated together and produce litters totalling 50 rats, which of the following proportions is most likely?

    A. 50 hooded : nil white.
    B. 50 white : nil hooded.
    C. 38 white : 12 hooded.
    D. 24 white : 26 hooded.
    E. 10 white : 40 hooded.

12. In a living plant cell chlorophyll absorbs light and as a result

    A. carbon dioxide is fixed into phosphoglyceric acid.
    B. carbohydrates are formed
    C. ATP is converted into ADP.
    D. ADP is converted into ATP and hydrogen is released from water.
    E. oxygen is released from CO_2.

13. In slightly diluted sea water, the small marine worm Gunda swells when deprived of oxygen and shrinks again when oxygen is supplied. What is the most likely explanation?

    A. Lack of oxygen results in an incomplete oxidation of waste products.
    B. The lack of oxygen increases water absorption.
    C. Excess water is poisonous to the organism.
    D. When less oxygen is available, there is not enough energy to oppose osmotic entry of water.
    E. An increase of surface area gives a better means of oxygen absorption.

14. Grazing beef cattle utilise only about 1/7th of the plant food they eat. The intensive rearing of animals in buildings can improve greatly on this. Which of the following factors is least likely to affect this?

    A. Competition for food by other animals is prevented.
    B. The animals receive less light.
    C. There is less loss of body weight.
    D. Less energy is used in movement.
    E. Special additions can be made to the diet.

15. Which of the following would be the best way of testing the hypothesis that two given enzymes affect the rate of a certain reaction?

    A. Try the reaction with a mixture of the enzymes at different temperatures.
    B. Purify the enzymes and then try them out on the reaction.
    C. Try the enzymes separately and together on the reaction.
    D. Try inhibiting one enzyme by dialysis.
    E. Try mixtures of the enzymes in different proportions on the reaction.

16. Secretions of endocrine organs are not directly responsible for

    A. calcium metabolism.
    B. secretion by the adrenal cortex.
    C. changes in the uterine lining.
    D. changes of body temperature.
    E. general body growth.

17. Cobalt chloride paper is blue when dry. It gradually changes colour to pink in the presence of water vapour. Three 1 cm square dry cobalt chloride papers were treated as follows:

    The first was fastened to the upper surface of a leaf by means of a clip, the second to the lower surface in a similar way, and the third hung free in the air. The time taken for the papers to achieve a standard pink colour was noted. The first took 9 minutes, the second 10.5 minutes, the third 18.0 minutes.

    Which of the following conclusions is justified on this evidence alone?

    A. There are more stomata on the lower surface of the leaf than on the upper.
    B. No water vapour is given off from the lower surface of the leaf.
    C. The upper leaf surface gives off more water vapour than the lower.
    D. Both leaf surfaces give off water vapour at the same rate.
    E. There are no stomata on the upper surface of the leaf.

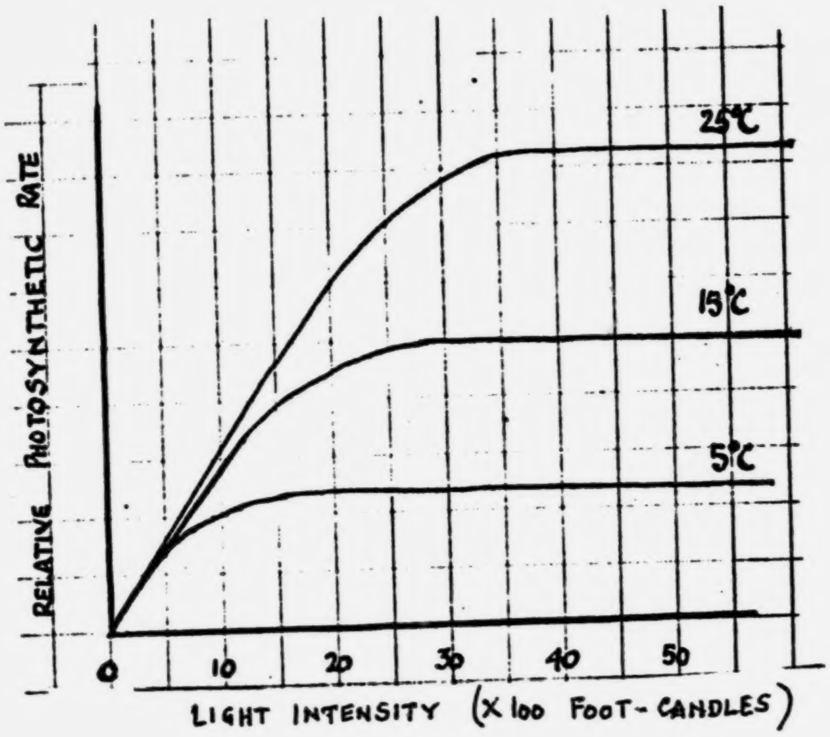
18. The maintenance of a constant body temperature in man involves a balance between production of heat and loss of heat. Which of the factors given below least affects this balance?

    A. The circulation of the blood.
    B. Evaporation of water from the body surfaces.
    C. Muscular contraction.
    D. Dilation of blood vessels in the epidermis.
    E. The heating of cold air in the lungs.

19. Lymph is forced into the tissues by

A. blood pressure.
B. the action of the liver.
C. intestinal villi.
D.. the action of the kidney.
E. diffusion.

20. In an experiment with a certain plant, the photosynthetic rate per unit of leaf area was measured at different light intensities. The experiment was repeated at three different temperatures, 5°C, 15°C and 25°C. An adequate supply of carbon dioxide was maintained throughout the experiments. The graph shows the results.



What factor or factors determine the photosynthetic rate in light intensities more than 3,000 foot-candles?

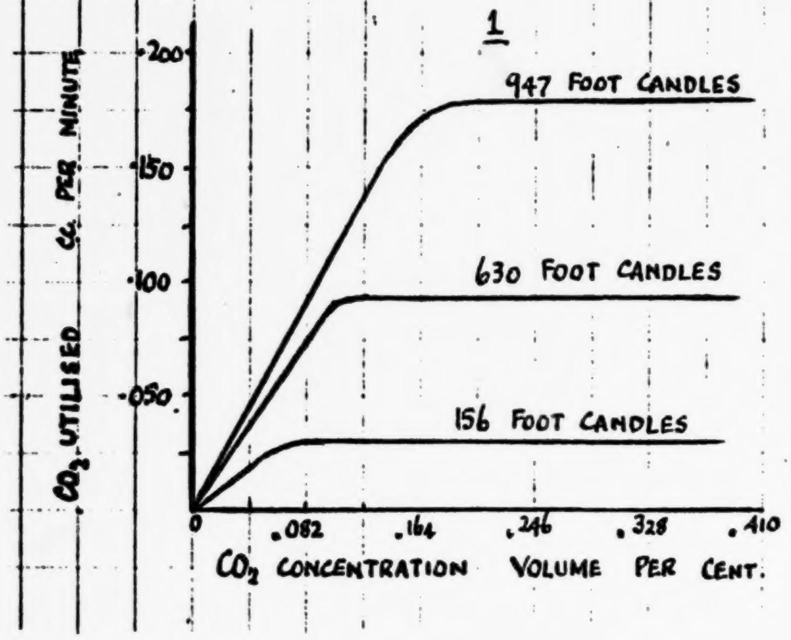
A. Light intensity.
B. Temperature.
C. Temperature and light intensity.
D. Water status of plant.
E. The factor can not be determined from the graph.

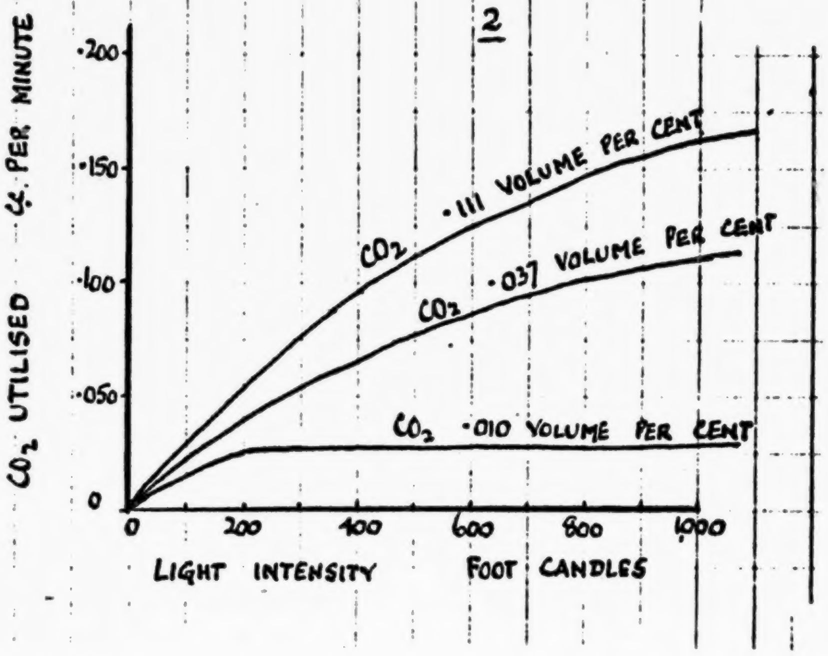
PLEASE TURN OVER YOUR ANSWER CARD.

21. Two students tested to see whether they were of the same A.B.O. blood type. Each drew a small sample of blood, the samples were diluted with physiological salt solution and then mixed. Observations under a microscope showed no clumping of the corpuscles. They came to the conclusion that they were of the same blood type. Which of the following is the best comment on their conclusion?

- A. The conclusion is wrong.
- B. The conclusion is not in agreement with the facts of the experiment.
- C. There are not enough facts revealed by the experiment to make the conclusion valid.
- D. Owing to the employment of poor experimental techniques, the observations prompted a conclusion in disagreement with accepted biological science.
- E. The conclusion is justified.

Questions 22,23,24 and 25 refer to the following graphs, which show the relationships between the carbon dioxide (CO_2) utilisation by wheat plants and the carbon dioxide concentration (volume per cent) in the outside air and the light intensity (foot candles) respectively.





22. It has been stated that the data shown in fig. 2 indicate that, of light intensity and carbon-dioxide concentration, the factor which limits carbon-dioxide utilization and thus photosynthesis, is the concentration of carbon-dioxide present in the air. Which of the following is correct?

- A. The statement is true according to the graph.
- B. The statement is false according to the graph.
- C. The statement cannot be judged by the graph but is in accord with an established biological principle.
- D. The statement cannot be judged by the graph and is not in accord with an established biological principle.
- E. The statement cannot be judged by the graph or by an established biological principle.

23. It has also been stated that fig. 1 shows that if the amount of carbon dioxide is decreased from .123% by volume and the light intensity held constant, there is an increase in carbon dioxide utilisation. Which of the following is correct?

A. The statement is true according to the graph.
B. The statement is false according to the graph.
C. The statement cannot be judged by the graph but is in accord with an established biological principle.
D. The statement cannot be judged by the graph and is not in accord with an established biological principle.
E. The statement cannot be judged by the graph or by an established biological principle.

24. The carbon dioxide content of the layer of air next to the wheat in a cornfield on a clear warm summer day would be less than on a still warm night. Which of the following is correct?

A. The statement is true according to the graphs.
B. The statement is false according to the graphs.
C. The statement cannot be judged completely by the graphs but is in accord with an established biological principle.
D. The statement cannot be judged completely by the graphs and is not in accord with an established biological principle.
E. The statement cannot be judged completely by the graphs or by an established biological principle.

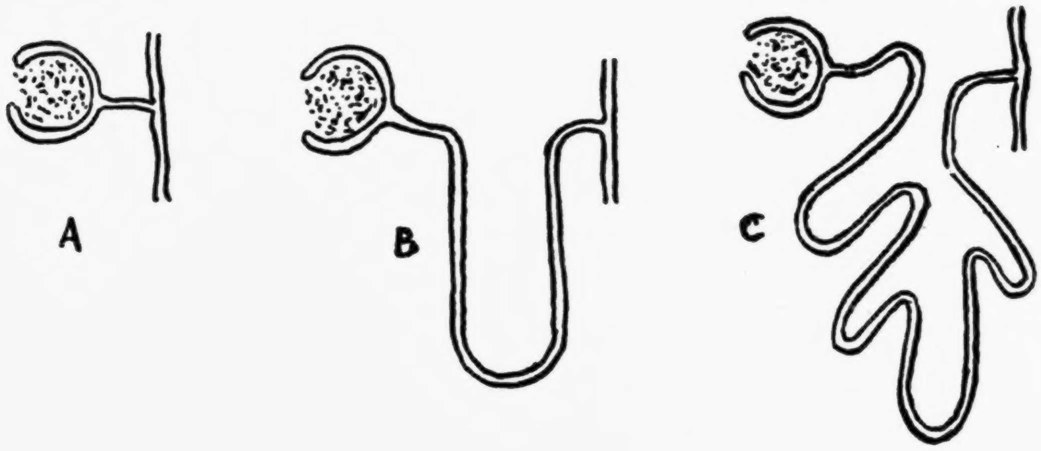
25. The carbon dioxide content of the air is approximately 0.03% by volume. The light intensity at noon on a clear summer day is in the neighbourhood of 8,000 to 10,000 foot candles. Is it to be expected, on the basis of the data given in fig.1 that the rate of photosythesis will be limited on a warm clear summer day by the carbon dioxide content of the air, rather than by the lack of sufficient light? Which of the following is correct?

A. Yes. It is supported by the data.
B. No. It is false.
C. It cannot be judged but is in accord with an established biological principle.
D. It cannot be judged and is not in accord with an established biological principle.
E. It cannot be judged from the graph or by an established biological principle.

26. Which one of the following is not controlled by hormones?

A. Water uplift in the stem.
B. Downward growth of the radicle.
C. Flowering under the influence of increasing day length.
D. Falling of the leaves of deciduous trees in autumn.
E. Orientation of shoots towards lateral light.

Questions 27 and 28 refer to the following. The primary function of a kidney tubule is to reabsorb water. The diagrams show three types of kidney tubules (nephrons).



27. Which kidney tubule (nephron) is most likely to occur in a desert animal?

A. A.
B. B.
C. C.
D. It is impossible to say.
E. It will depend upon whether the animal is a herbivore or a carnivore.

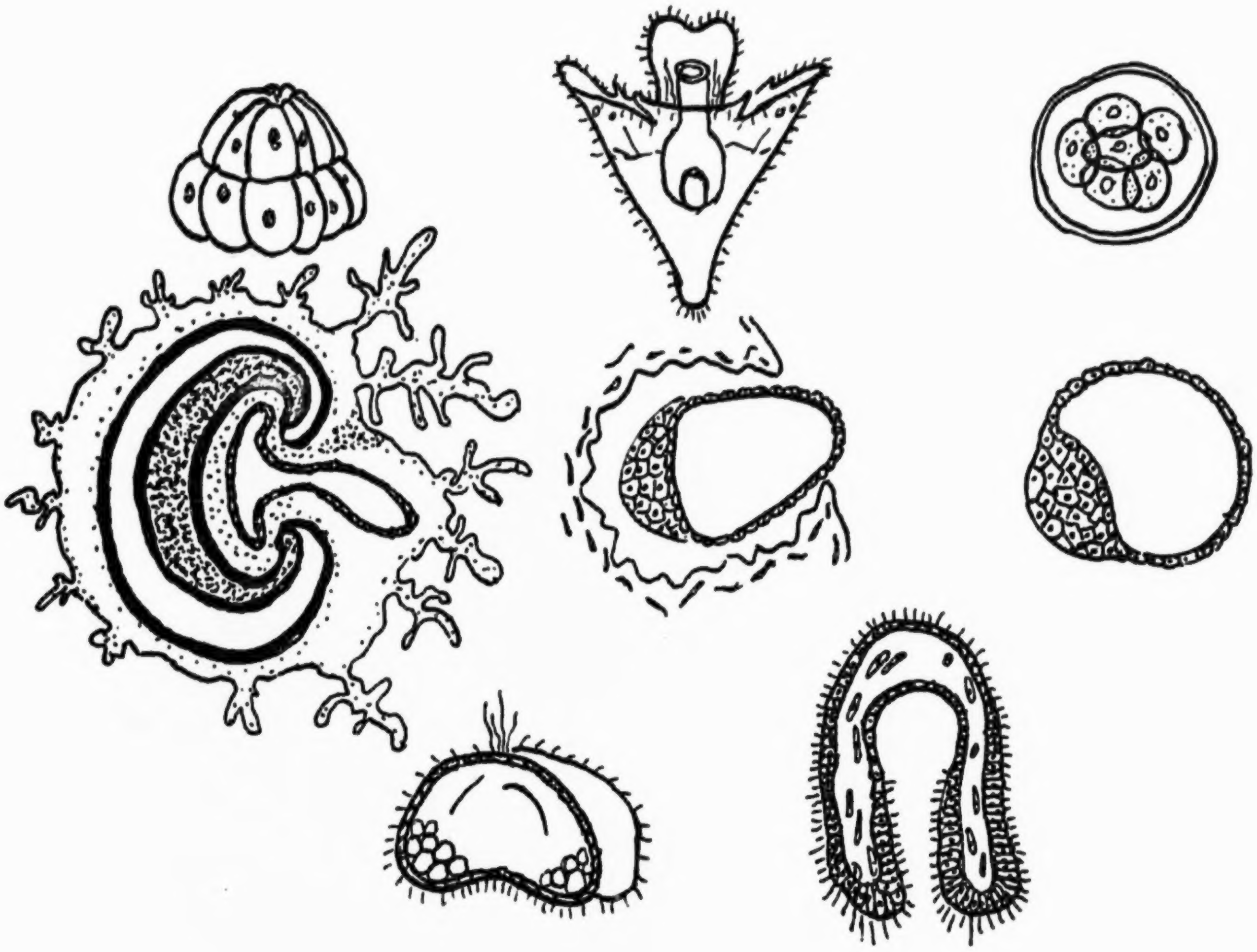
28. Which kidney tubule (nephron) is most likely to occur in fresh-water animals?

A. A.
B. B.
C. C.
D. It is impossible to say.
E. It will depend upon whether the animal is cold-blooded or warm-blooded.

29. Which of the following best describes the egg cell in the embryo sac of a plant?

A. It is formed by mitosis.
B. It gives rise to the endosperm.
C. It is analogous to a pollen grain.
D. It is a zygote.
E. It is a female gamete.

30. The diagrams show the external appearance or sections of embryonic stages of two kinds of animals. Which two kinds are they?



A. Amphibia and reptiles.
B. Echinoderms and mammals.
C. Fish and mammals.
D. Coelenterates and birds.
E. Insects and birds.

31. In order to obtain two crops in one growing season a farmer planted some seeds which he had harvested the previous week but the seeds failed to germinate. What can be concluded from this observation?

A. The farmer did not provide the right conditions for germination.
B. The seeds needed a longer period of maturation.
C. The farmer had not removed inhibiting substances.
D. The seeds required a period of low temperature.
E. The data are inadequate for a conclusion to be reached.

32. Some organisms are difficult to classify as plants or animals because they are

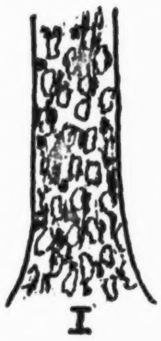
A. decomposers.
B. capable of acting as both producers and consumers.
C. microscopic and thus too difficult to study.
D. able to build up complex foods, by making use of light energy.
E. producers.

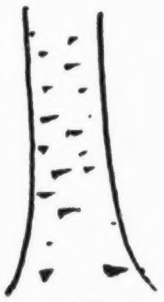
Questions 33, 34, 35 and 36 refer to the following drawings and the descriptive paragraph.

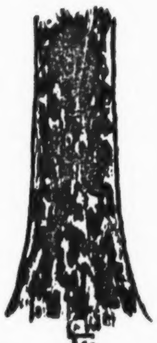
Drawing I to IV represent the trunks of trees:

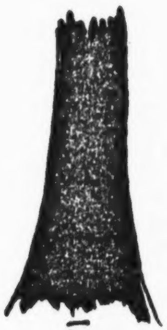
I Light coloured trunk encrusted with lichens
II Light smooth trunk
III Dark rough trunk
IV Dark smooth trunk

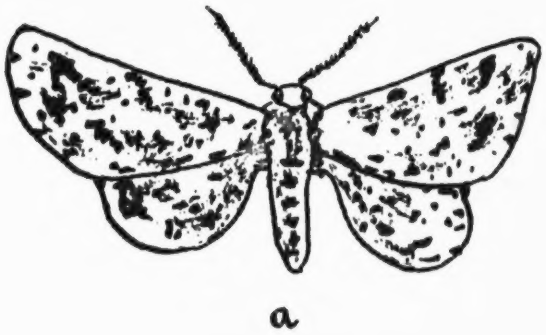
a and b represent two forms of the same moth, a light speckled form and a predominantly dark, or melanic, form.

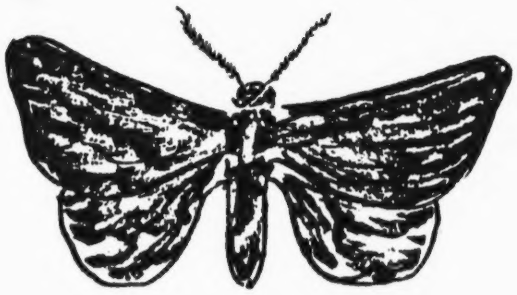

I


II


III


IV


a


b.

Until about 1850 the only form of this moth that had been recorded was that shown at a. Then the dark form shown at b was reported for the first time in woods close to what has since become a large industrial town. By the end of the 19th century the dark form had become quite common and now it is, in many localities, the commoner of the two forms, especially in the vicinity of large towns, where it often comprises as much as 95% of the total population, although the light form predominates in areas away from large centres of population.

33. Which of the following best explains the appearance of the dark specimen in 1850?

A. The colour change was induced by air pollution.
B. The organisms adapted themselves to the change in external environment.
C. Air pollution affected the moths directly after their emergence from the pupal stage.
D. A mutation, that had occurred before but had failed to become established, became established because it was favoured by changes in the external environment.
E The caterpillars ate soot contaminated leaves and dark moths developed from them.

34. Which one of the following hypotheses would be of little value when designing experiments to investigate the problem described in the paragraph.

A. Caterpillars from eggs laid by pure-breeding light-coloured moths will emerge as dark-coloured moths if fed on leaves contaminated with industrial soot.
B. The dark form of moths can be obtained by irradiating, by means of X rays, the eggs laid by pure-breeding light-coloured moths.
C. When bred in captivity under extreme conditions of temperature or humidity the dark form proves hardier than the light form.
D. The dark-coloured adults fly more strongly than the light-coloured ones.
E. If paper models of the two forms are exposed in equal numbers on a dark tree trunk, birds will peck off more of the light ones than the dark ones.

35. The paragraph describes a case of evolution through

A. sexual selection,
B. natural selection.
C. competition.
D. geographical isolation.
E. inheritance of acquired characters.

36. Which one of the following statements is probably NOT true of this species of moth?

A. It usually frequents woodland habitats.
B. It rests during the daytime on exposed tree trunks and branches.
C. It is apparently distasteful to birds.
D. The caterpillars feed on the leaves of trees.
E. It will often be caught in moth traps near large towns.

37. The Galapagos Islands in the Pacific are believed never to have been connected to the mainland. In the Islands there are 14 species of finch-like birds with no obvious relatives elsewhere in the world. The finches vary from island to island. There is a close resemblance between species in plumage, calls, nests, and eggs, but each species differs greatly in beak modifications according to the diet. The species do not interbreed and do not compete for food. It is stated on this evidence that isolation is an important factor in the production of new species.

A. The statement is supported by the information given.
B. The statement is not supported by the information given.
C. The statement is contradicted by the information given.
D. The statement is known to be false but this is not supported by the information given.
E. No relevant information is given.

38. It has been noticed in recent years that the proportion of insects surviving after exposure to certain insecticides has shown a gradual increase with succeeding generations. Of the following, which is the best explanation?

   A. World changes in climate have provided a new environment.
   B. Insects which have been exposed to the insecticide and have recovered have passed on an immunity to their offspring.
   C. Elimination of the less resistant strains gives the resistant ones a greater chance of success.
   D. Changes in the habits of the insects have enabled them to survive.
   E. The insecticide causes favourable mutations.

39. An adaptation one might expect to find in some "successful" desert plants would be a

   A. large leaf area and a thick impermeable cuticle.
   B. large leaf area and a large absorbing root surface.
   C. small leaf area and a large absorbing root surface.
   D. small leaf area and a thin, permeable cuticle.
   E. small leaf area and a small absorbing root surface.

40. Which of the following does NOT provide evidence of evolution?

   A. Green plants can be arranged in order from simple to complex.
   B. Embryos of birds, reptiles, and mammals have gill clefts resembling those of a fish embryo.
   C. The ancestry of animals like the horse can be traced through the fossil record.
   D. The caecum is present in all mammals including man but is only functional in some.
   E. The individuals within a species differ considerably one from another.

END OF BOOKLET 15

I. E. A.

IEA/16

BOOKLET 16

SCIENCE

CHEMISTRY - CHE

NATIONAL OPTION CHEMISTRY

1. Which of these solutions is one-molar, that is, 1 M ?

   A. A solution containing 1 molecule of solute per unit volume of water.
   B. A solution containing 1 molecule of substance dissolved in 1 mole of water.
   C. A solution containing 0.1 formula weight in grams of a substance in 100 millilitres of solution.
   D. A solution containing 0.1 gram of solute in 100 millilitre of solution.
   E. A solution containing 1 formula weight of solute in 1 millilitre of water.

2. Which one of the following formulae represents a substance which you would NOT expect to exist under normal laboratory conditions?

   A. NaH.
   B. H_2S.
   C. SiO_2.
   D. $AlCl_2$.
   E. O_3.

3. If N is Avogadro's number, and the gram molecular weight or molar weight of a compound is A, the weight of one molecule of the compound is
   A. N/A.
   B. A x N.
   C. 2A x N.
   D. A/N.
   E. 2A/N.

4. What is the change in oxidation number (oxidation state, valency) of manganese in the reaction represented by the equation

$$MnO_2 + 4\ HCl \longrightarrow MnCl_2 + Cl_2 + 2\ H_2O\ ?$$

   A. 2.
   B. 3.
   C. 4.
   D. 5.
   E. 6.

5. When an aqueous solution of sodium iodide is electrolysed with platinum electrodes, the main product at the cathode (negative electrode) is

   A. oxygen molecules.
   B. iodine molecules.
   C. hydroxyl ions (OH^-).
   D. sodium atoms.
   E. hydrogen molecules.

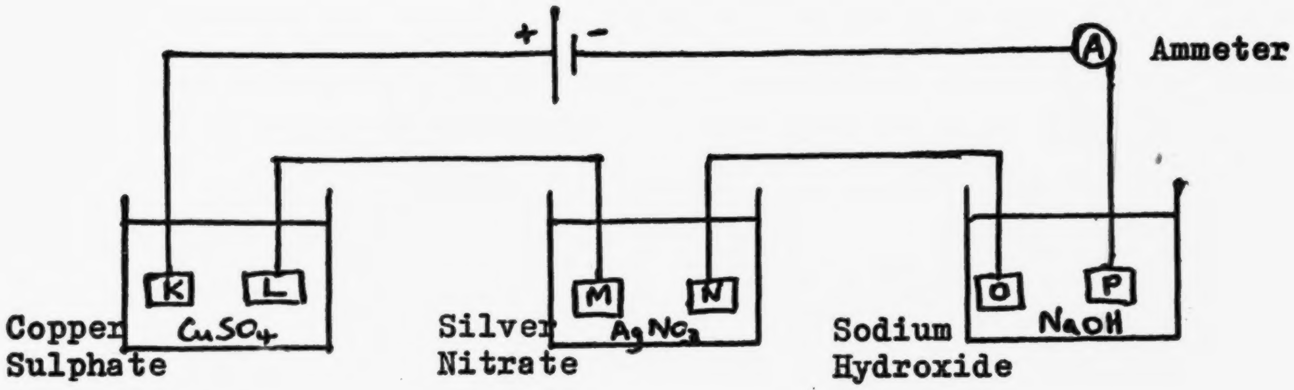
6. 3 g of a substance dissolved in 40 g of camphor gives the freezing point of camphor a depression of 50°C. The molecular depression of freezing point for camphor (1000 grams solvent) is 40°C. The molecular weight of substance is

   A. 40.
   B. 60.
   C. 80.
   D. 100.
   E. 120.

7. What is the minimum weight of NaCl that is needed to prepare 7.1 g of chlorine? (Approximate atomic weights: Na = 23, Cl = 35.5)

   A. 5.9 g.
   B. 7.1 g.
   C. 11.7 g.
   D. 12.7 g.
   E. 14.2 g.

8.



Copper strips K and L, silver strips M and N and platinum strips O and P, which are equal to each other in surface area and weight, are hung opposite each other in aqueous solutions of copper sulphate, silver nitrate and dilute sodium hydroxide respectively. They are connected in series as the figure shows, and a constant current of 0.5 amp is sent through for 30 minutes.

Approximate atomic weights : Ag = 108 Cu = 63.5 Pt = 195
N = 14.0 O = 16.0 H = 1.00
Na = 23.1 S = 32.0

1 Faraday = 96,500 coulombs; Avogadro's number = 6.02×10^{23} molecules/ g mole.

Which strip gained most weight?

   A. Copper strip K.
   B. Copper strip L.
   C. Silver strip M.
   D. Silver strip N.
   E. Platinum strip P.

9. In the periodic table group beginning with nitrogen, how do metallic characteristics change with increasing atomic weight?

   A. The metallic characteristics increase.
   B. The metallic characteristics decrease and the heaviest element in the group is non-metallic.
   C. The metallic characteristic does not change.
   D. The metallic characteristic becomes strong or weak periodically not by groups.
   E. We cannot tell because the periodic table gives no guide to metallic or non-metallic character.

10. If an atom of a radioactive element first emits an alpha particle and then emits a beta particle, the nuclear charge will

   A. decrease by 1 unit.
   B. increase by 1 unit.
   C. decrease by 2 units.
   D. decrease by 3 units.
   E. decrease by 4 units.

11. The word "covalent" is correctly used to describe all the strong bonds between the atoms in

   A. magnesium oxide.
   B. copper sulphate.
   C. sodium chloride.
   D. carbon disulphide.
   E. nickel.

12. The presence of ions in a water solution of a substance is most directly detected by

   A. finding out if it conducts electricity.
   B. measuring the density of the solution and comparing it with those of the pure solute and water.
   C. seeing if the solution has an electric charge.
   D. evaporating the solution and testing the residue for conductivity.
   E. adding an ionic substance and seeing if there is a reaction.

13. Which of the following series of numbers represents the electronic structure of an element with a variable valency (oxidation state)?

   A. 2, 8, 7.
   B. 2, 8, 15, 2.
   C. 2, 8, 18, 2.
   D. 2, 8, 8, 1.
   E. 2, 8, 18, 7.

Questions 14 and 15 refer to a portion of the periodic table

I	III	VII	VIII
T	U	V	W
		X	

Hypothetical elements T, U, V, W and X are located in the upper half of the periodic table of elements shown above. Elements T, U, V and W are all in the same period, with element T a member of group I, element U a member of group III, element V a member of group VII and element W the last element in the period. Element X is in the same group as element V and is immediately below it.

14. Which of the following comparisons of elements T and V is correct?

    A. V is more electronegative than T.
    B. V is more metallic than T.
    C. Atoms of V have fewer valence electrons than do those of T.
    D. Atoms of V have fewer electrons than do those of T.
    E. The usual valence (combining capacity) of V is greater than that of T.

15. Which of the following comparisons of elements V and X is correct?

    A. Atoms of V have fewer valence electrons than atoms of X.
    B. Atoms of V are smaller than those of X.
    C. V is more metallic than X.
    D. V is much less reactive than X.
    E. V has a much higher melting point than X.

16. The boiling point of sodium chloride (formula weight 58.5) is 1413°C whereas the boiling point of carbon tetrachloride (formula weight 154) is 77°C. On considering the formula weights it might be expected that carbon tetrachloride would have the higher boiling point. The reason for the observed result is that sodium chloride is

    A. a solid and carbon tetrachloride is a liquid.
    B. ionic and carbon tetrachloride is covalent.
    C. an inorganic substance whereas carbon tetrachloride is an organic substance.
    D. soluble in water whereas carbon tetrachloride is not.
    E. based upon a cubic unit lattice but carbon tetrachloride has a tetrahedral unit structure.

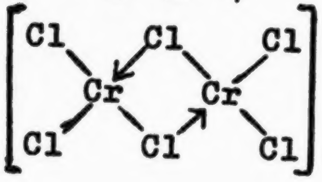
17. Chromic chloride hexahydrate has the empirical formula $CrCl_3.6H_2O$. It exists in several isomeric forms and when one of these isomers is allowed to react with excess of silver nitrate in aqueous solution 2 moles of silver chloride are precipitated for every mole of the chromium salt. The structure of this isomer could be represented as

A. $Cr(H_2O)_6^{3+} + 3Cl^-$.

B. $CrCl_3(H_2O)_3 + 3H_2O$.

C. $(CrCl\,(H_2O)_5)^{2+} + 2Cl^- + H_2O$.

D. $(CrCl_2(H_2O)_4)^+ + Cl^- + 2H_2O$.

E.  $+ 12H_2O$.

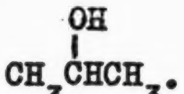
18. The half life of the radioactive isotope potassium, K^{42}, is 12.4 hours. The activity of a sample will be reduced to 3% of its original value after an estimated time of

A. 12.4 hours.
B. 37.2 hours.
C. 42 hours.
D. 63 hours.
E. 124 hours.

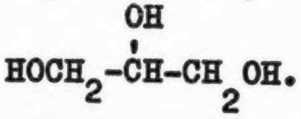
19. Selenium is the element below sulphur in the periodic table. One would expect selenium to

A. be a metal with a high boiling point.
B. form a potassium oxy-salt of formula K_3SeO_4.
C. burn in air to form an oxide SeO.
D. dissolve in nitric acid to form a salt $Se(NO_3)_4$.
E. form a compound H_2Se which is weakly acidic in aqueous solution.

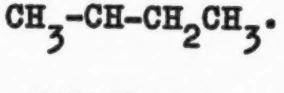
20. Which one of the following compounds can exist in optically active forms?

A.  $CH_3\overset{OH}{C}HCH_3$.

B. $CH_3.CH{=}CH.CH_3$.

C.  $HOCH_2-\overset{OH}{C}H-CH_2OH$.

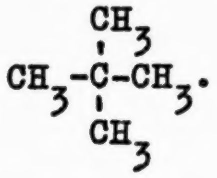
D. $CH_3.CH{=}CH_2$.

E.  $CH_3-\overset{OH}{C}H-CH_2CH_3$.

PLEASE TURN OVER YOUR ANSWER CARD.

Considering the factors which influence the strength of intermolecular (van der Waals) forces, hydrogen bonding and solubility, select one each of the following compounds (A to E) in answer to questions 21 and 22.

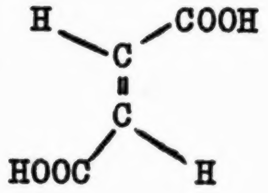
A. $CH_3-CH_2-CH_2-CH_2-CH_3$.

B. 

$CH_3-\underset{CH_3}{\overset{CH_3}{C}}-CH_3$.

C. $CH_3-CH_2-CH_2-CH_2-CH_2OH$.

D. CH_3-CH_3.

E. 

21. Which of these compounds is contained in bottle (i)?

22. Which of these compounds is contained in bottle (v)?

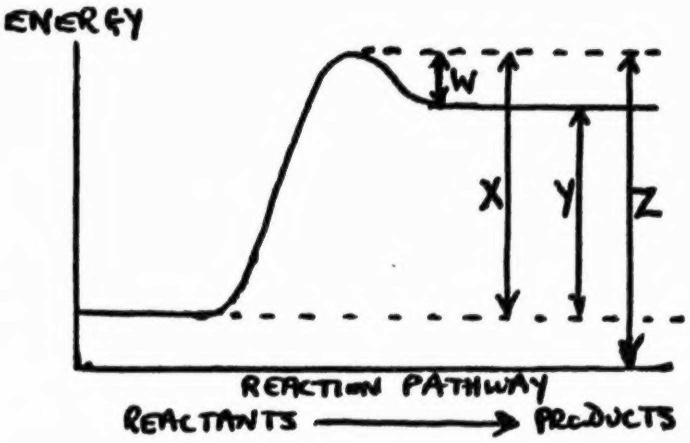
23. The electronegativity (electron attracting power) of a given element on Pauling's scale can be estimated from the electronegativities of the neighbouring elements in the periodic table. In estimating the electronegativity of chlorine from those of the elements to the left and right of it in period III, the determining factor is that, in going to the right in the period,

A. chemical reactivity decreases.
B. the number of filled energy levels per atom increases.
C. the van der Waals radius increases.
D. the density decreases.
E. the nuclear charge increases.

24. In a similar manner to that described in the previous question an electronegativity value for radium (Ra) can be obtained by using the electronegativity values of the neighbouring elements in Group II. The determining factor in this case is that in going down group II

A. melting point increases.
B. the number of filled energy levels per atom increases.
C. atomic radius decreases.
D. nuclear radius decreases.
E. electrical conductivity decreases.

Questions 25 to 27 relate to the following potential energy diagram for the reaction Br + $H_2 \longrightarrow$ HBr + H.


ENERGY
W
X
Y
Z
REACTION PATHWAY
REACTANTS ⟶ PRODUCTS

25. **The heat of reaction is represented by**

A. W.
B. X.
C. Y.
D. Z.
E. Z minus W.

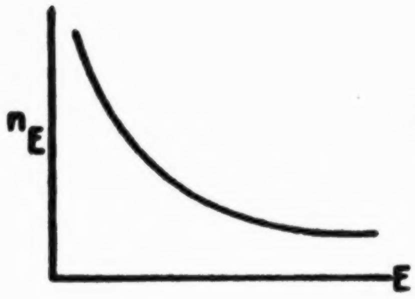
26. **The energy of activation for the above reaction is represented by**

A. W.
B. X.
C. Y.
D. Z.
E. Z minus W.

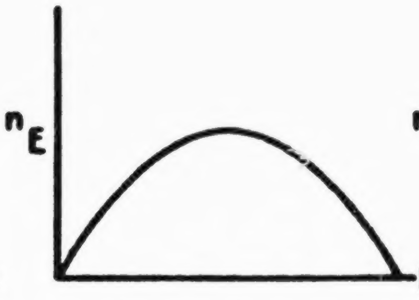
27. **The activation energy for the reverse of the reaction given above (i.e. for the reaction, HBr + H$\longrightarrow$Br + H_2) is represented by**

A. W.
B. X.
C. Y.
D. Z.
E. Z plus X.

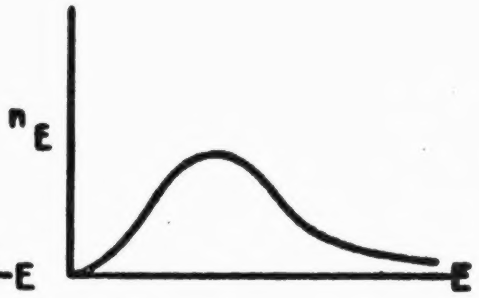
28. Which of the following represents the variation of the number of molecules or atoms, n_E, having energy E in a sample of a gas at room temperature?



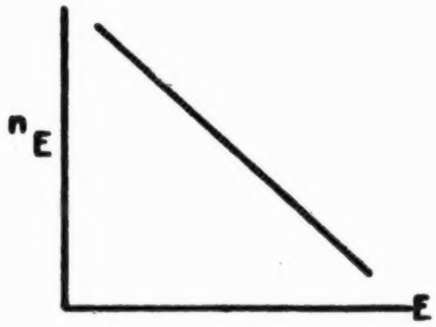
A.



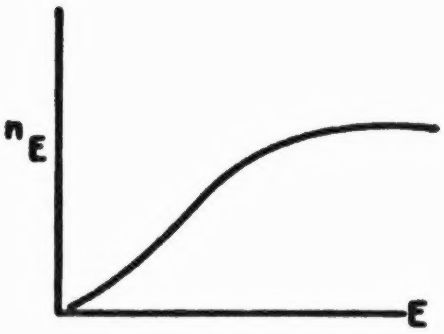
B.



C.



D.



E.

29. A reaction does not take place in the dark but proceeds explosively as soon as exposed to light. Which is the best explanation of this fact?

A. Light provides the energy which is released as heat in the explosion.
B. Light initiates the reaction which then proceeds very rapidly.
C. Light acts as a catalyst, being regenerated during the explosion.
D. Light heats the unstable reactant(s) which then explode.
E. The total reaction is endothermic and light initiates it by supplying much more than the required energy.

30. Assuming equilibrium is reached in the reaction

$2CO + O_2 \rightleftharpoons 2CO_2$ $\Delta H = -135$ kcal (The reaction to the right is exothermic.)

a greater yield of CO_2 will be obtained by

A. raising the temperature and pressure.
B. lowering the temperature and pressure.
C. raising the temperature and lowering the pressure.
D. lowering the temperature and raising the pressure.
E. adding a catalyst and raising the pressure.

31. When a small speck of lead monoxide was added to a concentrated solution of hydrogen peroxide, the solution became hot and eventually erupted violently. In this process large amounts of oxygen were given off. Which of the following is the best explanation?

A. The great amount of heat is due to the release of oxygen by decomposition of lead monoxide; no catalysis is involved.
B. The reaction is catalysed by lead monoxide but unaffected by a rise in temperature.
C. The reaction is not catalysed by lead monoxide but is accelerated by a rise in temperature.
D. The reaction is unaffected by a rise in temperature but catalysed by products.
E. The reaction is catalysed by lead monoxide and accelerated by a rise in temperature.

32. The rate of reaction of two substances X and Y is measured at several concentrations of X and Y as shown in the table.

Rate of reaction millimoles/litre second	12	36	24
Concentration of X moles/litre	5	15	10
Concentration of Y moles/litre	5	5	10

The rate of reaction is

A. proportional to the concentration of X but independent of the concentration of Y.
B. proportional to the concentrations of X and Y.
C. proportional to the concentration of Y but independent of the concentration of X.
D. dependent on the concentrations of X and Y but not satisfactorily expressed in A, B or C.
E. dependent on some unspecified factors other than concentration.

33. Aluminium is extracted from bauxite by

A. heating bauxite in a plentiful supply of air.
B. reducing bauxite with coke in a furnace.
C. reducing bauxite with water gas in a furnace.
D. electrolysing bauxite dissolved in sulphuric acid.
E. electrolysing bauxite dissolved in melted cryolite.

34. Which of the following elements is most likely to yield the highest oxidation state of a transition metal when combining with it?

A. Iodine.
B. Sulphur.
C. Fluorine.
D. Phosphorus.
E. Hydrogen.

35. On the basis of the periodic table, which of the following would be described best as an oxide which is only basic?

A. Al_2O_3.
B. CO.
C. P_2O_5.
D. NO_2.
E. CaO.

36. A compound X, of the formula C_3H_8O, on partial oxidation gives C_3H_6O. From this information, X is most likely to be

A. an alkanal (aldehyde).
B. a tertiary alkanol (alcohol).
C. an alkene (olefin).
D. a secondary alkanol (alcohol).
E. an ether.

37. The reaction represented by the equation $CH_3CH(OH)NH\text{-}NH_2 \longrightarrow CH_3CH\text{=}N\text{-}NH_2 + H_2O$ is an example of what kind of reaction?

A. Addition.
B. Polymerisation.
C. Rearrangement.
D. Substitution.
E. Elimination.

38. A liquid compound behaves as follows :

It reacts with sodium.
It reacts with acetic acid in the presence of sulphuric acid to give a sweet smelling ester.
It is completely miscible with water.
It contains only the elements carbon, hydrogen and oxygen.

The compound is

A. definitely ethyl alcohol.
B. probably an ether.
C. probably an alcohol.
D. probably an organic base.
E. probably a carboxylic acid.

39. A student wishes to see how temperature affects the solubility of a salt in water. His method is as follows :

He shakes an excess of the salt with water at a known temperature until no more appears to dissolve. He then filters to obtain a clear solution. After weighing a portion of this solution, he evaporates the water and weighs the dry salt. He then repeats the procedure at the same temperature as a check before proceeding to another temperature.

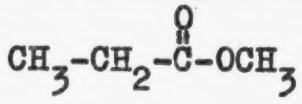
Which of the following is apt to cause the greatest error during determination of the solubility at a given temperature.

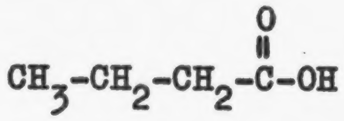
A. Allowing solution temperature to change prior to filtration.
B. Allowing solution temperature to change during evaporation.
C. Allowing solution temperature to change at any time during the procedure.
D. Not using the same size of salt crystals in the check determinations.
E. Not adding the same excess of salt in the check determinations.

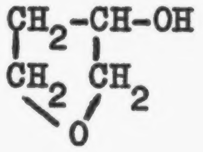
40. The molecular formula for an organic compound is found to be $C_4H_8O_2$. The following properties of the compound were experimentally determined.

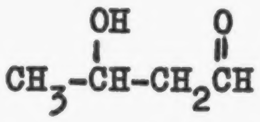
I. 0.1 mole of sodium metal reacts with 0.1 mole of the compound to liberate 0.05 mole of H_2 gas.
II. The compound forms an ester by one step.
III. The compound is not easily oxidised.

On the basis of the above information, which of the following is the most likely structural formula for the compound?

A.

$CH_3-CH_2-\overset{\overset{O}{\|}}{C}-OCH_3$

B.

$CH_3-CH_2-CH_2-\overset{\overset{O}{\|}}{C}-OH$

C.


D.

$CH_3-\overset{\overset{OH}{|}}{C}H-CH_2\overset{\overset{O}{\|}}{C}H$

E. $HO-CH_2-CH = CH-CH_2OH$

END OF BOOKLET 16

I. E. A.

IEA/17

BOOKLET 17

SCIENCE

PHYSICS - PHY

NATIONAL OPTION PHYSICS

1. Which of the following statements involves vector quantities only?

   A. Gravitational field strength is 9.8 N/kg.
   B. Each solid body has weight and inertial mass.
   C. Water freezes at 273°K and boils at 373° K.
   D. The charge on an electron is: $e = 1.6 \times 10^{-19}$C.
   E. The kinetic energy of a free falling body is equal to the difference between its potential energy at the start and the end of fall.

2. The ratio of the mass of the sun to that of the earth can be calculated from

$$\frac{Ms}{Me} = \frac{Re^3}{Rm^3} \cdot \frac{Tm^2}{Te^2}$$ where Ms = mass of sun

Me = mass of earth

Re = radius of earth's orbit about the sun

Rm = radius of moon's orbit about the earth

Te = period for 1 revolution of earth around the sun

Tm = period for 1 revolution of moon around the earth

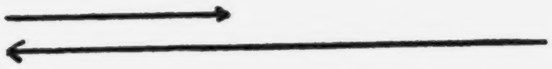
The following list gives values for these quantities, with estimates for the errors of measurement for each.

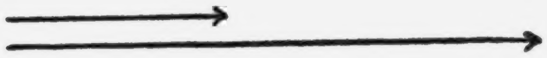
Re	149,500,000 km	±	16,000 km
Rm	384,420 km	±	160 km
Te	365.3 days	±	0.1 days
Tm	27.32 days	±	0.01 days

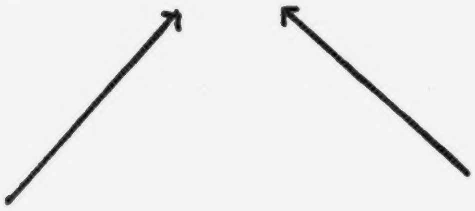
Which quantity contributes most to the error in calculating the value of the ratio $\frac{Ms}{Me}$?

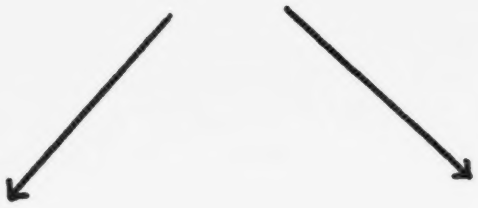
   A. Re.
   B. Rm.
   C. Tm.
   D. Te.
   E. All contribute approximately equally.

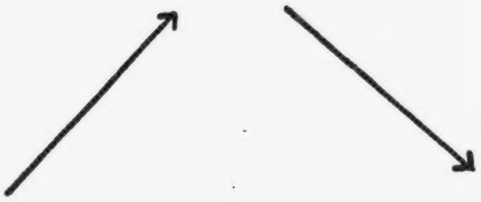
3. Which of the five systems of vectors shown has the resultant represented by ⟶ ?


A


B


C


D


E

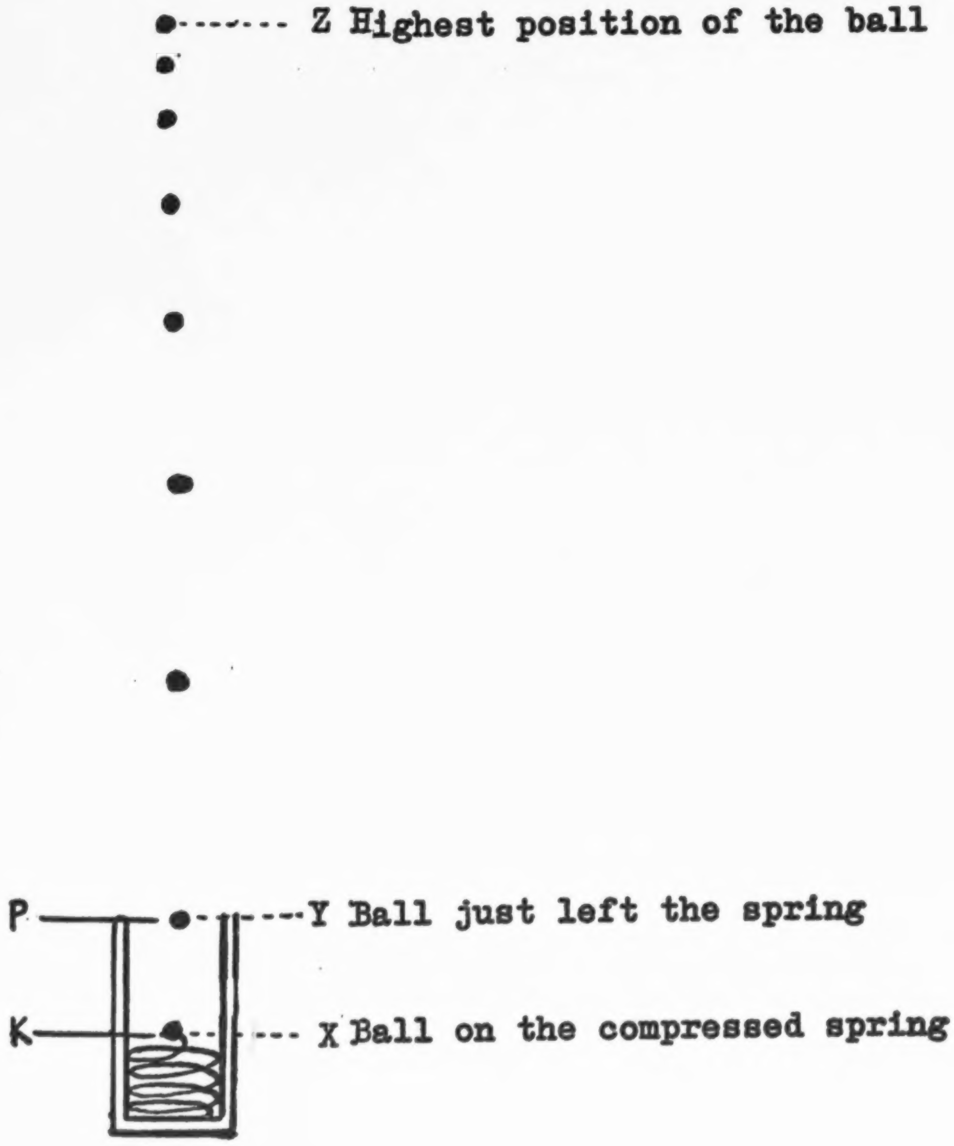
4. If the earth's mass were twice as great as it is, its period of revolution about the sun (assuming it stayed in the same orbit) would

A. increase 4 times.
B. increase 2 times.
C. decrease by a factor of 2.
D. decrease by a factor of 4.
E. remain the same.

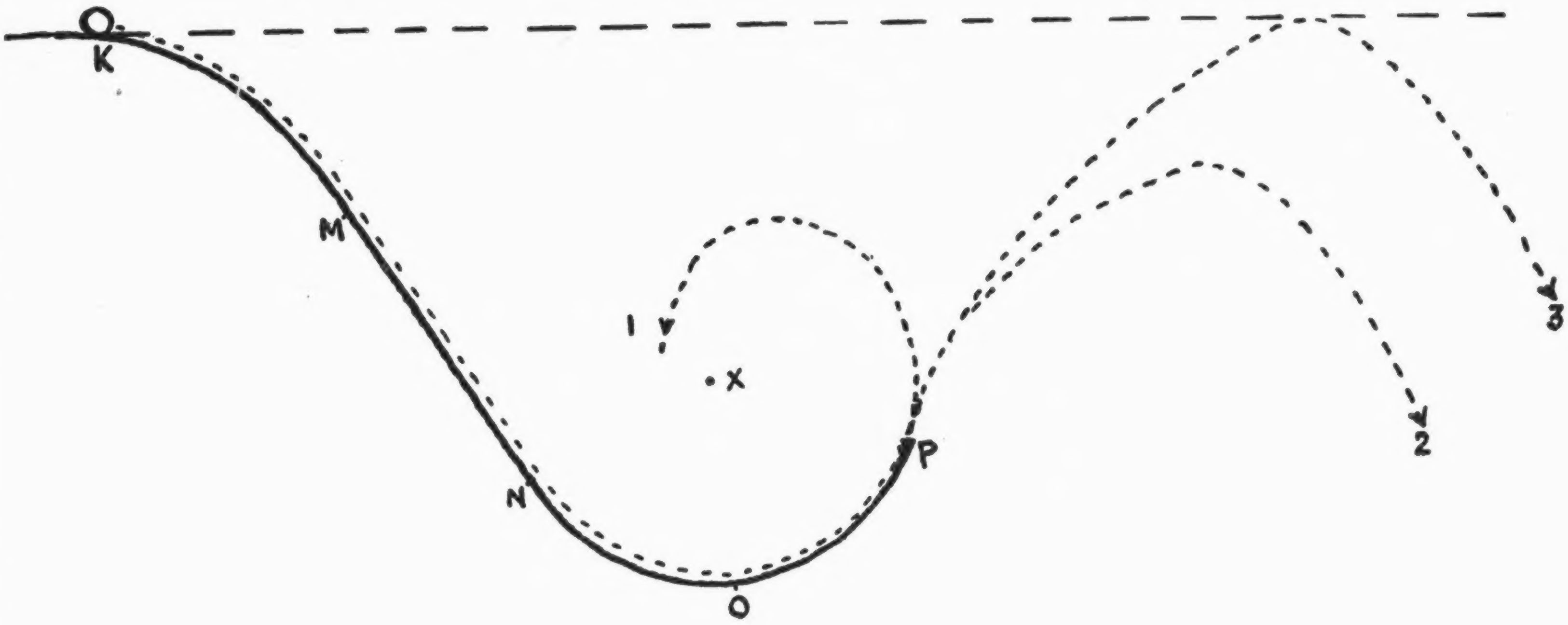
5. The figure shows the respective positions which a small ball occupied every 1/7 second after it had been shot up vertically by a spring. Assume that the spring is compressed to the point K and then released, and that the ball leaves the spring at P. Z is the highest position that the ball reaches. Assume air resistance to be negligible.

Assuming that the acceleration due to gravity is $9.8\ m/s^2$, what is the acceleration of the ball at the position Y?

A. Zero.
B. Less than $9.8\ m/s^2$.
C. $9.8\ m/s^2$.
D. Greater than $9.8\ m/s^2$.
E. It is impossible to say unless the height the ball rises is given.


Z Highest position of the ball
P
Y Ball just left the spring
K
X Ball on the compressed spring

6. A ball was released at the position K on the rail shown in the figure. On the rail the part MN is a straight line, and the part N O P is a circular arc with its centre at X. The ball moved along the rail and then went off from the rail at the position P, which is lower than X.



Assuming that the friction between the ball and the rail, the rotation of the ball and the air resistance are all negligible, which one of the alternatives is correct?

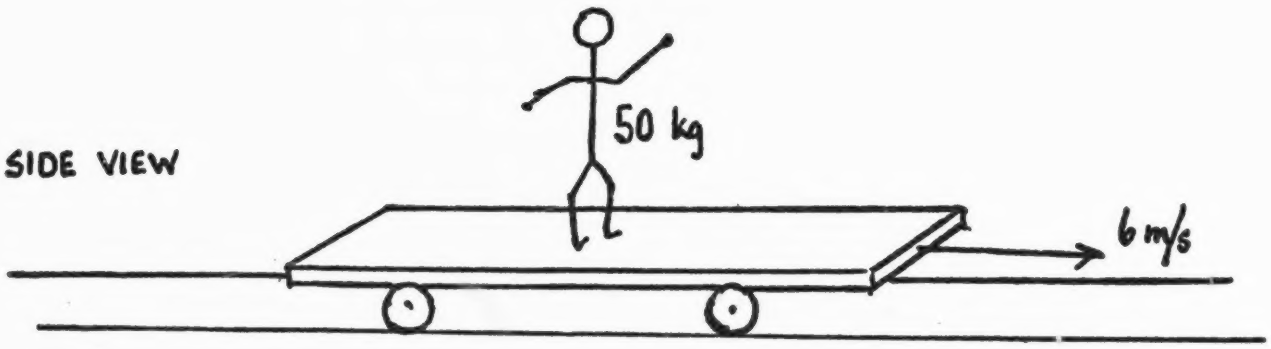
- A. The ball moved as shown in the curve 1 in the figure running off from the circular path owing to the gravitation.
- B. As there is not any resistance, it reached the same height as the point K, but the actual path cannot be determined.
- C. As the mechanical energy of the ball changed owing to contact with the rail, it did not reach quite the same height as the point K.
- D. As the direction of the ball going off from the point P is inclined to the vertical, it moved as shown in the curve 2 in the figure.
- E. As the mechanical energy is conserved, it moved as the curve 3 in the figure.

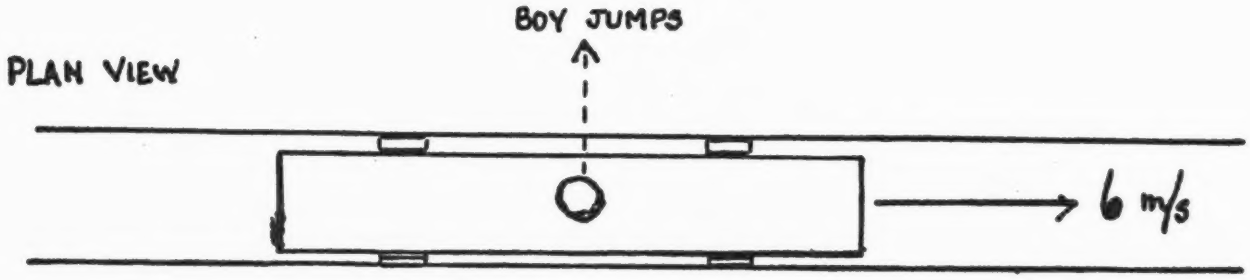
7. A 5 kg ball moving at 20 m/s collides with a ball of unknown mass moving at 10 m/s in the same direction. After collision, the 5 kg ball moves at 10 m/s and the other ball at 15 m/s.

The mass of the second ball is

- A. 2 kg.
- B. 6 kg.
- C. 10 kg.
- D. 12 kg.
- E. 30 kg.

8. A 50 kg boy stands on a trolley of mass 100 kg. The trolley is travelling to the right on rails at a constant speed of 6 m/s.





After the boy jumps sideways off the trolley at right angles to it, the speed of the trolley is about

A. 3 m/s.
B. 4 m/s.
C. 6 m/s.
D. 9 m/s.
E. 12 m/s.

9. Water at a depth of 4.0 m in a constant-head reservoir flows with friction through a horizontal tube and issues from the open end with a speed of 6.0 m/s. About what fraction of the mechanical energy of the water is lost in friction?

A. Zero.
B. 0.33.
C. 0.45.
D. 0.55.
E. 0.67.

10. If, in an imaginary situation, a 1 kg block of ice at 0°C is dropped from such a height that all of it is melted by the heat generated on impact with the ground, from what height would a 25 kg block of ice have to be dropped to melt completely, assuming that in both cases all of the heat is absorbed by the ice?

    A. 25 times as high.
    B. 5 times as high.
    C. 1/5 as high.
    D. 1/25 as high.
    E. The same height.

11. A boat loaded with rocks floats in a small swimming pool. If the rocks are thrown overboard into the water, the level of the water in the pool

    A. rises.
    B. remains the same.
    C. falls.
    D. the result depends on the density of the boat.
    E. the result depends on the relative densities of the rocks and the material of the boat.

12. 2 g of hydrogen are in a rigid container. 2 g of another gas are introduced, temperature remaining constant. The pressure in the container, assuming no chemical reaction occurs,

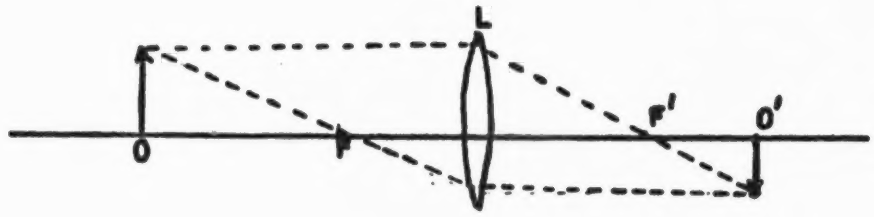
    A. increases by a factor of between 1 and 2.
    B. doubles.
    C. is multiplied by a factor greater than 2.
    D. remains constant.
    E. may be higher or lower, depending on the deviation of the mixture from the ideal.

13. A jar of oxygen gas and a jar of hydrogen gas are at the same temperature. The molecules of the gases have on average the same

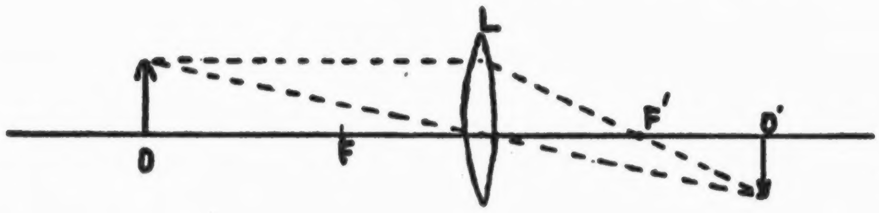
    A. velocity.
    B. momentum.
    C. force.
    D. potential energy.
    E. translational kinetic energy.

14. The three figures 1, 2, 3, give the graphical construction for image O' of object O as produced by the thin lens L with foci F and F'.

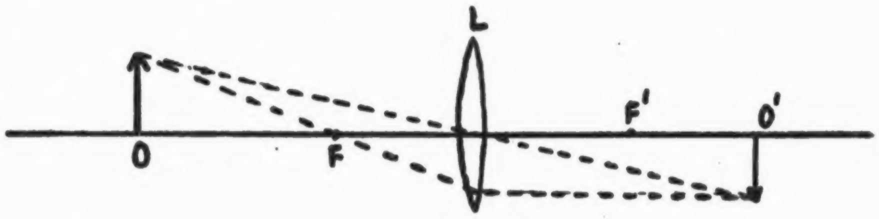
1



2



3



Which, if any, of these three figures are correct?

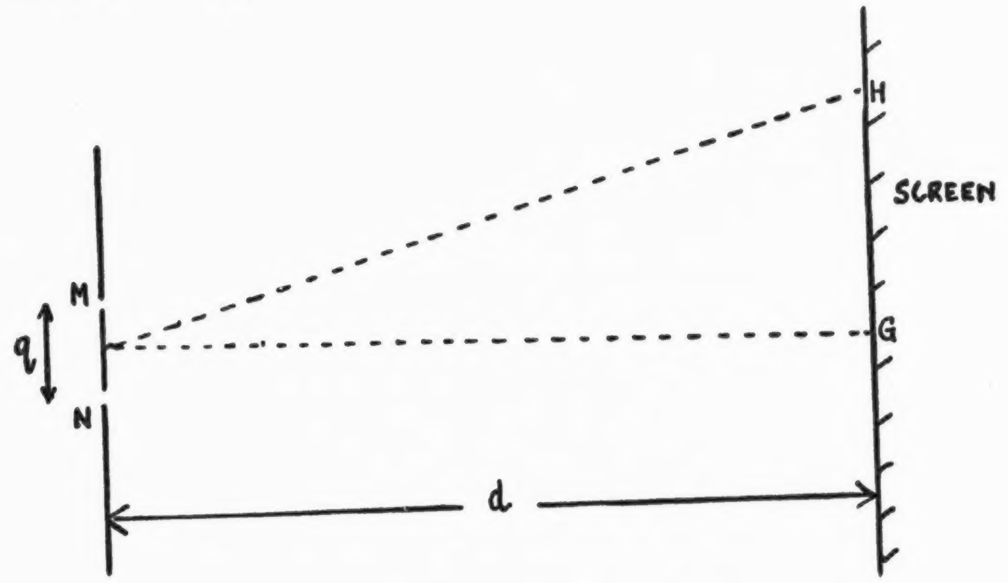
A. Figures 2 and 3 are correct.
B. Figures 1 and 3 are correct.
C. Figures 1 and 2 are correct.
D. None of the figures are correct.
E. All three figures are correct.

15. Sound is not an electromagnetic radiation. The best evidence for the truth of this statement is the fact that

A. audible sounds have a wavelength (in air) of about 1 m (about middle E).
B. diffraction effects can be observed.
C. sound can be produced by vibrating solids.
D. sound travels at 300 m/s in air.
E. sound can be refracted.

16. Two long narrow slits, M and N, are sources of monochromatic light and the light waves emerging from them are in phase.

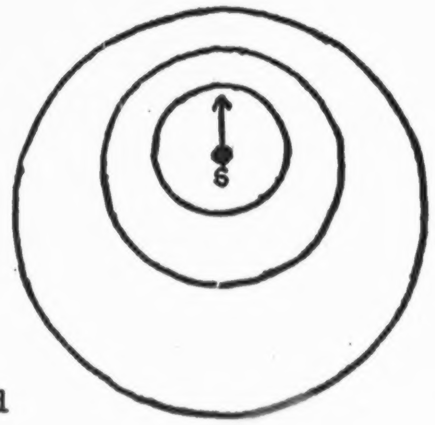
A screen is placed parallel to the slits and at a distance d from them, where d is very large compared to q, the distance between them. The point G on the screen is equidistant from the mid-points of the two slits.



If there is a point H on the screen such that the difference between the distances from each slit to H is equal to λ, where λ is the wavelength of the light, one would expect to see in in the vicinity of H

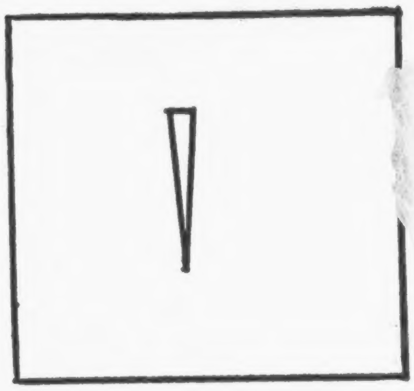
A. no interference pattern.
B. a boundary between a bright and a dark band, passing through H.
C. a dark band, centred on H.
D. a bright band centred on H.
E. a white band near H.

17. The sketch shows the pattern of circular waves produced by a moving source S in a tank of water. Given that sound can be described as a wave motion and that the pitch of a particular sound increases with frequency, which of the following phenomena might be predicted from this pattern?



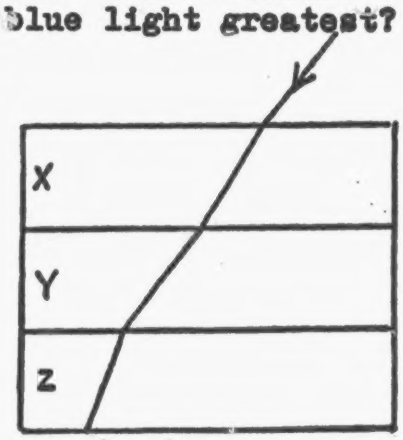
A. The intensity of sound from a moving source varies inversely as the square of the distance from the source.
B. The pitch of a musical note from a vibrating string varies with the tension of the string.
C. The sound of a passing automobile horn to an observer by the side of a road drops in pitch as the car passes.
D. The velocity of propagation of sound waves increases without a change in pitch as the sound passes into a denser medium.
E. The second harmonic is equal to twice the fundamental frequency.

18. A screen with a fine wedge-shaped slit (see sketch) is set up in a plane parallel to a photographic plate. Parallel, monochromatic light is sent through the slit and falls on the plate. The exposed area of the plate is a wedge



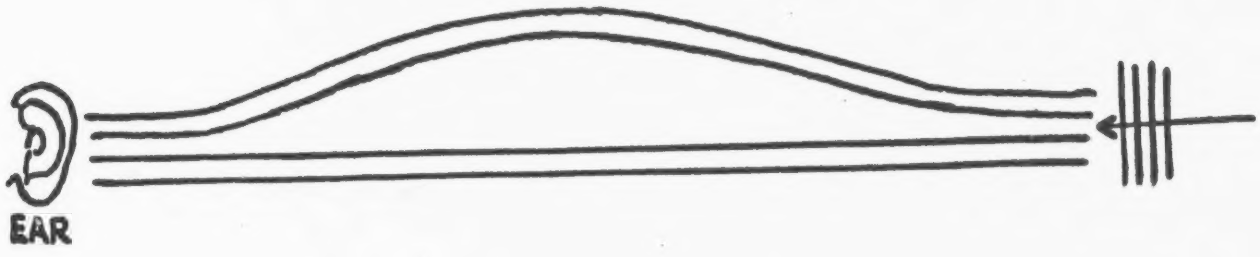
- A. of the same shape and size as the wedge used.
- B. widened uniformly by diffraction.
- C. narrowed uniformly by diffraction.
- D. widened most at the bottom by diffraction.
- E. narrowed most at the bottom by diffraction.

19. A ray of blue light passes through a stack of three parallel-sided blocks made of different materials. The path of the beam is shown. In which of the three blocks is the velocity of blue light greatest?



- A. X.
- B. Y.
- C. Z.
- D. The velocity is the same in all the blocks.
- E. the information given is insufficient to be able to say.

20. Sound waves 1 m in length are carried to a man's ear by two rubber tubes. With which of the following combinations of tube-lengths will the man hear no sound?



A. $\frac{3}{4}$ m , $1\frac{3}{4}$ m.

B. $\frac{3}{4}$ m , $2\frac{1}{4}$ m.

C. 1m , $2\frac{3}{4}$ m.

D. $1\frac{1}{2}$ m , $2\frac{3}{4}$ m.

E. 2 m , 4m.

PLEASE TURN OVER YOUR ANSWER CARD.

21. Hertz detected radiations by means of a spark detector. On placing his receiver between the source of radiation and a metal sheet, he found that the strongest sparks resulted at multiples of a certain distance from the reflecting sheet.This suggests that Hertzian radiation consists of

A. transverse waves.
B. longitudinal waves.
C. waves, but gives no indication as to whether they are transverse or longitudinal.
D. ultrasonic radiation.
E. some form of energy moving through air with the speed of light.

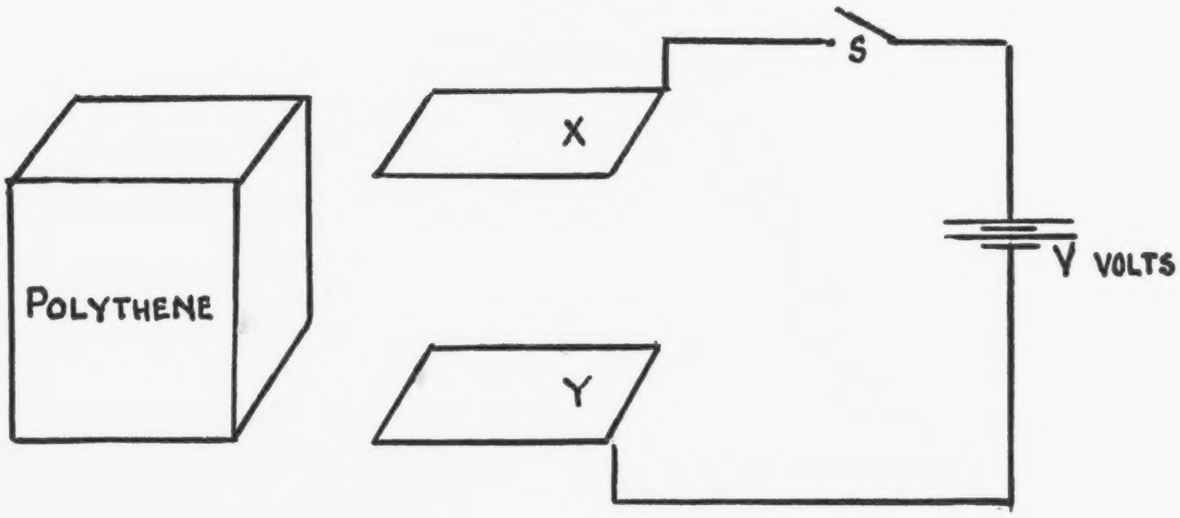
22. In the spectrum of the sun a continuous spectrum is crossed by many black lines (Fraunhofer lines). Which of the following statements is correct?

A. The black lines are caused by Fraunhofer diffraction at the telescope.
B. The black lines are caused by the absorption of light in the gases of the sun's atmosphere.
C. The spectrum of the sun lacks the spectral lines of all the elements present in the sun.
D. The black lines come from the combustion of elements at the sun.
E. The spectrum of the sun is changed in the space between sun and earth by cosmic radiation.

23. From observations that Vega is a bright blue-white star while Regulus is a bright orange star, we can conclude

A. that Vega has a higher surface temperature than Regulus.
B. that Regulus has a higher suffface temperature than Vega.
C. nothing about their surface temperatures.
D. that both stars generate energy by the proton-proton reaction to form helium.
E. that Vega is cooler than the sun.

24. The figure shows a circuit in which the switch S is closed for a few seconds and then opened. The two plates, X and Y act as a capacitor which acquires a charge Q, with a potential difference V and stored energy W. Switch S is now opened and a block of polythene is slid between X and Y. It is a close fit but does not touch either of them.

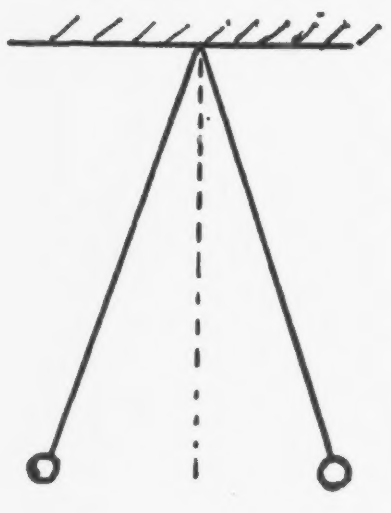


Which of the following statements is true?

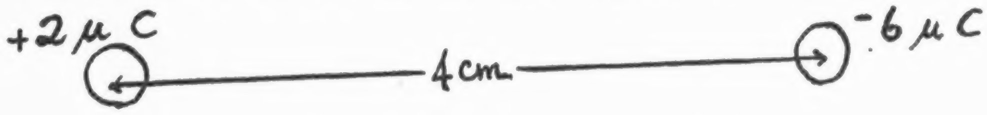
A. The capacitance, the potential difference and the energy stored all increase.
B. The capacitance, the charge, and the potential difference all increase.
C. The capacitance increases but the potential difference and the energy stored both decrease.
D. The charge remains the same but the energy stored and the potential difference both increase.
E. Since the switch is open, all remain unchanged.

25. Two electrically charged spheres are suspended from the same point by insulating threads of equal length and repel each other so that the threads make equal angles with the vertical. What can be said of the balls?

A. Their masses and charges are equal.
B. Their masses are equal, the charges may or may not be.
C. Their charges are equal, the masses may or may not be.
D. The ratio of charge to mass is the same for both.
E. The repulsive force on each must be equal to its weight.



26. Two small charges of $+2\mu C$ and $-6\mu C$ respectively are placed 4 cm apart as shown. Where should a third charge $-8\mu C$ be placed so that there is no net force on the $-6\mu C$ charge?



A. 4 cm left of the $-6\mu C$ charge.
B. 16 cm left of the $-6\mu C$ charge.
C. 16 cm right of the $-6\mu C$ charge.
D. 8 cm left of the $-6\mu C$ charge.
E. 8 cm right of the $-6\mu C$ charge.

27. Three parallel metal plates of equal area, equally spaced apart as shown, can be connected either as in fig.1 or as in fig.2 to a supply of V volts.

Fig. 1

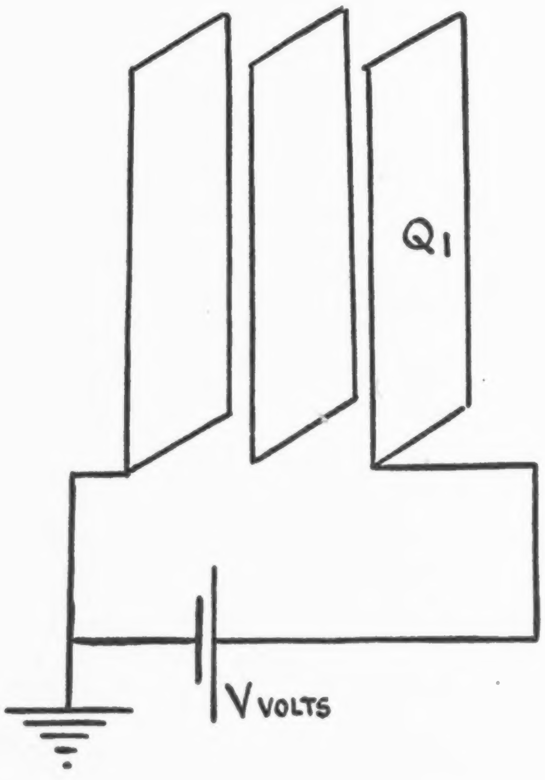
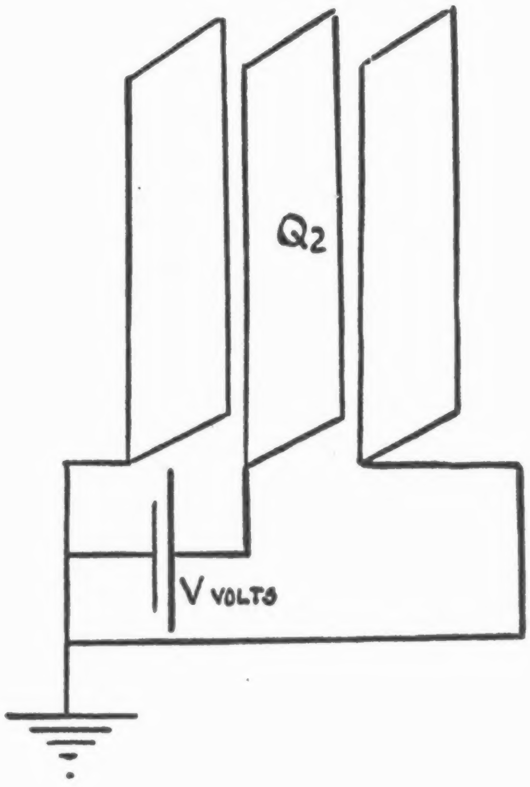


Fig. 2



If Q_1 is the charge stored when connected as in fig.1, and Q_2 the charge stored when connected as in fig. 2, the ratio $Q_1 : Q_2$ is equal to

A. 1 : 4.
B. 1 : 2.
C. 1 : 1.
D. 2 : 1.
E. 4 : 1.

28. If a sphere suspended by an insulating thread is attracted by a charged object, one can state with certainty that

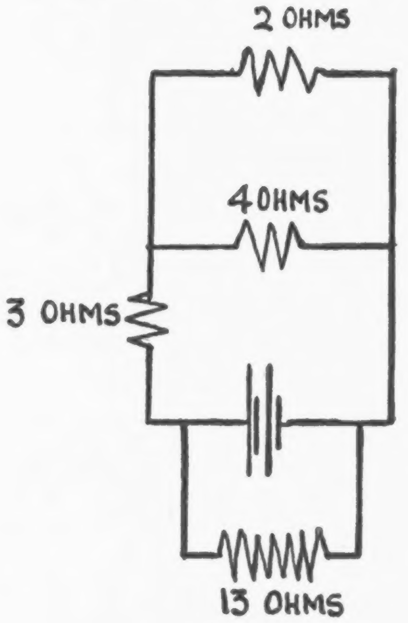
    A. the sphere had a net opposite charge.
    B. the sphere is a good conductor.
    C. the sphere has acquired a net opposite charge by ind induction.
    D. the sphere is a good conductor and had a net opposite charge.
    E. none of the above can be definitely concluded.

29. To convert a galvanometer into a voltmeter, a resistance R is connected to the galvanometer. What is the value of R in relation to the internal resistance of the galvanometer and how is it connected?

    A. R is low and connected in parallel across the galvanometer.
    B. R is low and connected in series with the galvanometer.
    C. R is high and connected in parallel across the galvanometer.
    D. R is high and connected in series with the galvanometer.
    E. Any of the above may be correct, depending on the desired sensitivity.

30. In the circuit shown, the current through the 2 ohm resistor is 2 amp. What is the potential difference across the 13 ohm resistor?

    A. 13 volts.
    B. 17 volts.
    C. 26 volts.
    D. 27 volts.
    E. The data are insufficient.

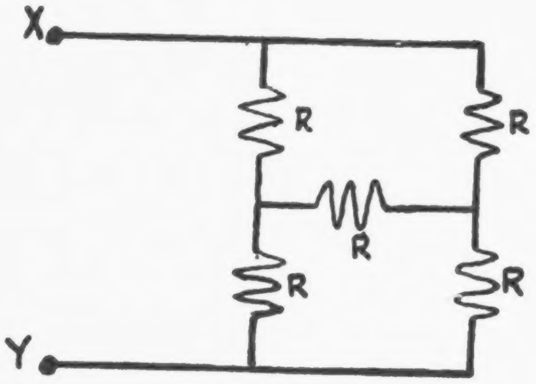


31. An electric water heater, which is thermally well-insulated so that no heat is lost to the surroundings, takes 20 minutes to boil a certain quantity of water, when the power supply voltage is 240 volts. Suppose the power supply voltage is 200 volts instead. About how long will the heater now take to boil the same quantity of water if the resistance of the heating element remains approximately constant?

    A. 14 minutes.
    B. 17 minutes.
    C. 20 minutes.
    D. 24 minutes.
    E. 29 minutes.

32. Each resistor in the diagram has the same resistance R. What resistance will be measured between terminals X and Y?

A. 2R.
B. $\frac{4R}{3}$
C. R.
D. $\frac{R}{2}$.
E. $\frac{R}{3}$.



33. Someone proposes to drive an electric generator by means of an electric motor. The generator alone supplies the motor with current so that its frequency of rotation remains constant. It will not work because

A. more current is produced in the generator than the motor can use.
B. of the direction of rotation.
C. of the induced voltage.
D. of the magnetic field.
E. in the generator and motor, energy is always being transformed into heat.

34. Under which of the following circumstances is an e.m.f. NOT induced in a conductor in a uniform magnetic field?

A. The magnetic field is moving at right angles to the conductor.
B. The conductor is moving at right angles to the magnetic field.
C. The magnetic field and the conductor are relatively stationary, but the magnetic field is increasing.
D. The conductor is moving parallel to the magnetic field.
E. The magnetic field and the conductor are stationary relative to each other, but the magnetic field in dying away to zero.

35. The following data are provided for the operation of a T.V. tube.

Electron beam current = $100\,\mu A$
Final anode potential = 10 kV
Mass of electron = 9×10^{-31} kg
Charge on the electron = 1.6×10^{-19} C

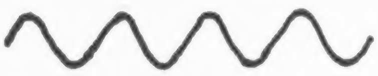
If the electrons make a spot of area 10^{-2} cm^2 on the screen, what is the pressure exerted by the electrons absorbed there?

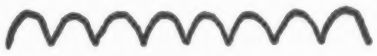
For calculation use the value of $\frac{m}{e}$ of the electron as $6 \times 10^{-12}\,\frac{kg}{C}$ approximately

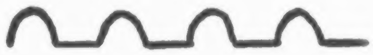
A. 4.6×10^{-4} N/m^2.
B. 5.3×10^{-3} N/m^2.
C. 3.5×10^{-2} N/m^2.
D. 6.1×10^{-1} N/m^2.
E. 8.2 N/m^2.

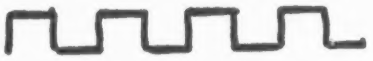
36. A thermionic diode valve is connected in the circuit shown.

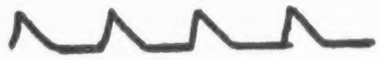
Which of the following would appear on the screen of the oscilloscope?

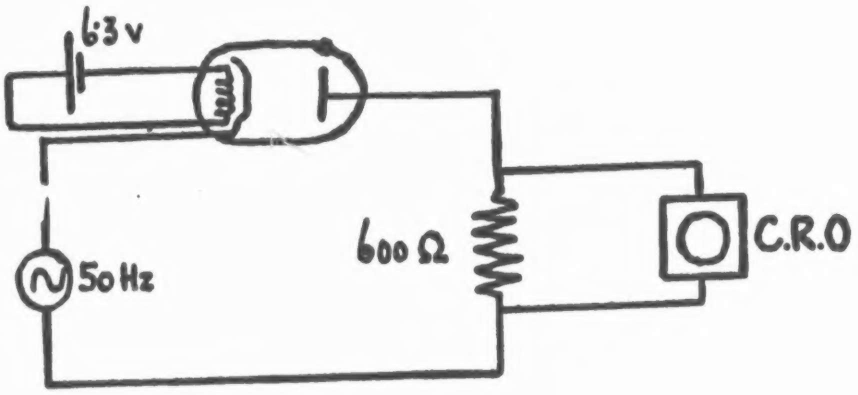
A 

B 

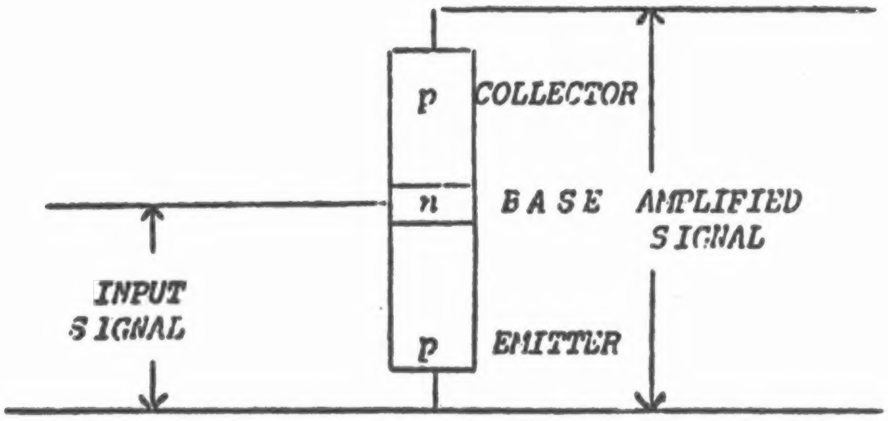
C 

D 

E 



37. **The p-n-p transistor shown below is to be used to amplify an input signal**


p
COLLECTOR
n
BASE
AMPLIFIED SIGNAL
INPUT SIGNAL
p
EMITTER

Which row in the following table is correct?

	The base voltage with respect to the emitter is	**The base voltage with respect to the collector is**
A	**positive**	**positive**
B	**negative**	**negative**
C	**positive**	**negative**
D	**negative**	**positive**
E	**negative**	**zero**

38. An isolated mercury atom, initially at rest, emits a photon of frequency ν and wavelength λ. Immediately after emission of the photon, it is certain that the mercury atom will

A. be ionised.
B. be in the ground state.
C. have at least one electron in the highest energy level.
D. emit an electron.
E. have at least one electron which is in a lower energy level than it was before.

39. By what nuclear change could an atom with atomic number Z and atomic mass W change into one with atomic number Z +1 and atomic mass W?

A. By emission of an alpha particle.
B. By emission of a beta particle.
C. By emission of gamma rays.
D. By absorption of a deuteron and then emission of a neutron.
E. By absorption of a neutron and the emission of a gamma photon.

40. If a photon collides with a free electron

A. energy is conserved; momentum is not.
B. momentum is conserved; energy is not.
C. both energy and momentum are conserved.
D. neither energy nor momentum need be conserved.
E. momentum is conserved; the nature of the collision determines whether energy is conserved.

END OF BOOKLET 17

I. E. A.

IEA/19
IEA/20
IEA/21
IEA/22
IEA/23

NATIONAL OPTION

SCIENCE PRACTICAL

PREPARATION OF SCHOOLS
FOR
SCIENCE PRACTICAL

PRACTICAL TESTS

The limited pre-testing of practical items (ST 2 and 3) we were able to do and the comments we have received from National Centers and the other sources have confirmed the view that certain practical skills and abilities desirable in science education can be tested by these abilities in our testing instruments.

Accordingly, as you know, we have included some "pencil and paper practical items" in tests IIA (IEA/4A), IIB (IEA/4B) and IVA (IEA/10A) Science, and we are offering further lists, which require a very modest amount of equipment, as a national or school option. In this way we hope to obtain information, not only about achievement in science under varying school conditions, but also about the effectiveness of different kinds of test items.

The tests being offered as National Options are

II	Science Practical	1 1/2	hours
IV	Science Practical	1 1/2	hours
IV	Biology Practical	1	hour
IV	Chemistry Practical	1	hour
IV	Physics Practical	1	hour

More time has been allowed than is likely to be needed by the students to carry out the actual operations. This has been done to allow time for the general organisation of the test and to remove from the students any sense of pressure.

The behavioural categories of the practical items can be expressed as follows.

I The ability to use simple apparatus and to implement simple procedures.

II The ability to observe changes/differences in structures or systems under investigation and to record such changes/differences in ways that yield maximum relevant information.

III The ability to select appropriate apparatus and/or procedures for a novel experimental problem.

The attached note sets out the information that should be given to schools concerning the conditions and materials required for the tests and the conduct of the actual testing.

The tests should be scored by the schools and the scores checked by National Centers.

We shall be grateful if you will let us know as soon as possible if you intend to carry out science testing in practical abilities.

Note on practical tests to be send by National Centers to participating schools

These tests of practical abilities important in the learning of science are part of an international study and have been so designed as to require only the simplest of facilities and materials and to need very little in the way of preparation by the teacher.

The provision of a laboratory or a practical room is not essential, but each student should have an adequate area of suitable, flat-topped working space and to have reasonable access to water (for washing up etc.) and to places for the disposal of solid and liquid wastes.

For some tests gas (or some equivalent) for heating will be required.

In some cases, marked * in the appended lists, one set of apparatus can be used for up to five or six students, but if this is done the apparatus must be disconnected and restored to its original position before each new student begins that section of the test. The student should not, of course, be told what the various substances and materials are.

There should be a clock with a sweep second hand (not a stop clock) so placed that all students can see it.

The tests should be marked according to the given schedules and returned to the National Centers.

Requirements for II Science Practical

Each student to have

a sharp pencil

a pair of scissors

pins

a bunsen burner or similar source of heat

one tube containing 1 cm^3 of solution (approximately 1 M iron III chloride $FeCl_3$) labelled X

one tube containing 1 cm^3 of solution (approximately 1 M zinc sulphate $ZnSO_4$) labelled Y

one tube containing 1 cm^3 of solution (approximately 1 M magnesium sulphate $MgSO_4$) labelled Z

a small lipped beaker containing about 100 cm^3 of approximately 2 M sodium hydroxide NaOH solution and labelled as such

a splint for testing for oxygen
* a 2 volt accumulator
a resistor
an ammeter
wire connections
2 lamps in holders with suitable terminals

any combinations that are suitable for the question may be used

Requirements for IV Science Practical

Each student to have

a tube containing 10 cm^3 distilled water labelled P

a tube containing 10 cm^3 12% sucrose solution labelled Q

a tube contining 10 cm^3 saturated sodium chloride ($NaCl$) solution labelled R

about 10 g fresh yeast labelled Organism F

a large beaker or jar of warm water (45°- 50°C at the beginning of the experiment)

rack for test tubes

a bunsen (or similar) burner

a tube containing a small quantity of substance (lead II oxide PbO) labelled substance α

a tube containing a small quantity of substance (lead IV oxide PbO_2) labelled substance β

a lipped beaker (about 100 cm^3) containing approximately 5M HCl and labelled liquid W

* a 2 volt accumulator
a resistor
an ammeter
a voltmeter
wire connections
2 lamps in holders with suitable terminals

any combinations that are suitable for the question may be used

Requirements for IV Practical Biology

Each student to have

a tube containing 10 cm^3 distilled water labelled P

a tube containing 10 cm^3 12% sucrose solution labelled Q

a tube containing 10 cm^3 saturated solution sodium chloride ($NaCl$) labelled R

about 10 g fresh yeast labelled Organism F

a large beaker jar of warm water (45°- 50°C at the beginning of the experiment)

rack for test tubes

ruler graduated in cm to 0.1 cm
pair of fine scissors
sheet of plain paper or thin card
sharp pencil
pins

Requirements for IV Practical Chemistry

Each student to have

one ignition tube
a bunsen (or similar) burner
a tube containing a small quantity of substance (lead II oxide PbO) labelled substance α
a tube containing a small quantity of substance (lead IV oxide PbO_2) labelled substance β
a tube containing a small quantity of substance (lead II nitrate $Pb(NO_3)$ crystals) labelled substance γ
a lipped beaker (about 100 cm^3) containing approximately 5 M HCl and labelled liquid W
a tube containing 1 cm^3 of solution (approximately 1 M iron III chloride $FeCl_3$) labelled X
a tube containing 1 cm^3 of solution (approximately 1 M zinc sulphate $ZnSO_4$) labelled Y
a tube containing 1 cm^3 of solution (approximately 1 M magnesium sulphate $MnSO_4$) labelled Z
a small lipped beaker containing about 100 cm^3 of approximately 2 M sodium hydroxide solution labelled as such
a rack for test tubes
a splint for testing for oxygen

Requirements for IV Practical Physics

Each student to have

a sharp pencil
a pair of scissors

* a 2 volt accumulator
a resistor
a ammeter
a voltmeter
wire connections
2 lamps in holders with suitable terminals

any combinations that are suitable for the question may be used

a pendulum bob tied to 100 cm of fine thread
a meter rule
a retort stand with boss and clamp
two strips of metal to act as jaws of the pendulum support

I. E. A.

IEA/19

BOOKLET 19

SCIENCE PRACTICAL II

POPULATION II SCIENCE PRACTICAL (National Options)

This test is concerned with some of the practical abilities that are important in science, such as being able to read instructions and carry out simple manipulations, to observe accurately and record observations in an appropriate way, and to select the best method and equipment for a particular purpose.

The questions will ask you to carry out instructions and to observe and record the results.

In most questions you are asked to choose the best answer from a number of alternatives and to circle the letter corresponding to it.

Here is an example.
Which one of the following would you use to weigh a large crystal of copper sulphate to an accuracy of 0.01 gram?

A. A measuring cylinder.
B. A compression spring balance reading in 0.5 Kg. to 10.0 Kg.
C. A set of household (kitchen) scales.
D. A chemical balance.
E. A milliammeter.

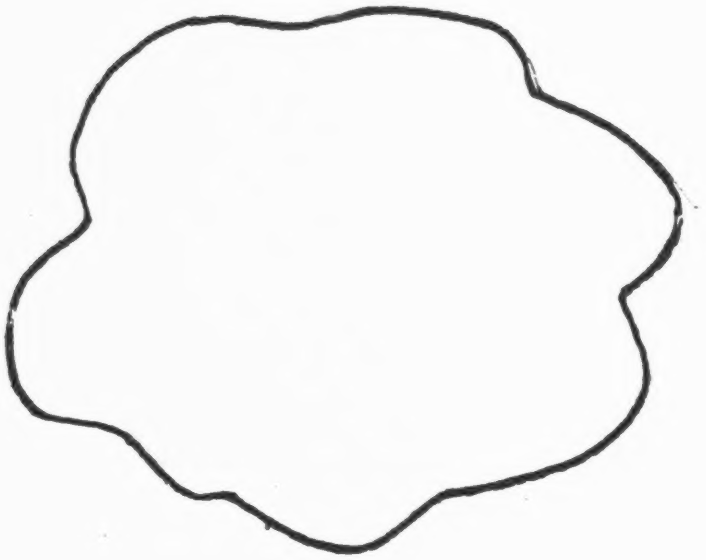
A measuring cylinder is used to measure volume, not weight. Similarly, a milliammeter is used to measure small electric currents. Hence we are left with B, C, and D, all of which are used for measuring weight. But, of these, only the chemical balance would be capable of weighing a crystal to 0.01 gram, so that is the correct answer and the D should be circled as shown.

In these questions you will have to make measurements or other observations and record the results in a different way. All you have to do is to follow the instructions carefully.

You will have plenty of time, so do not hurry. But you will have to plan your work and to organise your time efficiently as, of course, the ability to do this is an important part of laboratory work.

Do not waste time on questions you do not understand or cannot do. Leave them and pass on to the next ones; you can always come back to those you leave later if there is time.

Questions 1, 2 and 3 refer to the following outline shape.



The outline shown above represents a leaf, the area of which is to be determined.

Using the scissors provided, cut out the shape very carefully so that the cut-out has a thin black margin all round the edge.

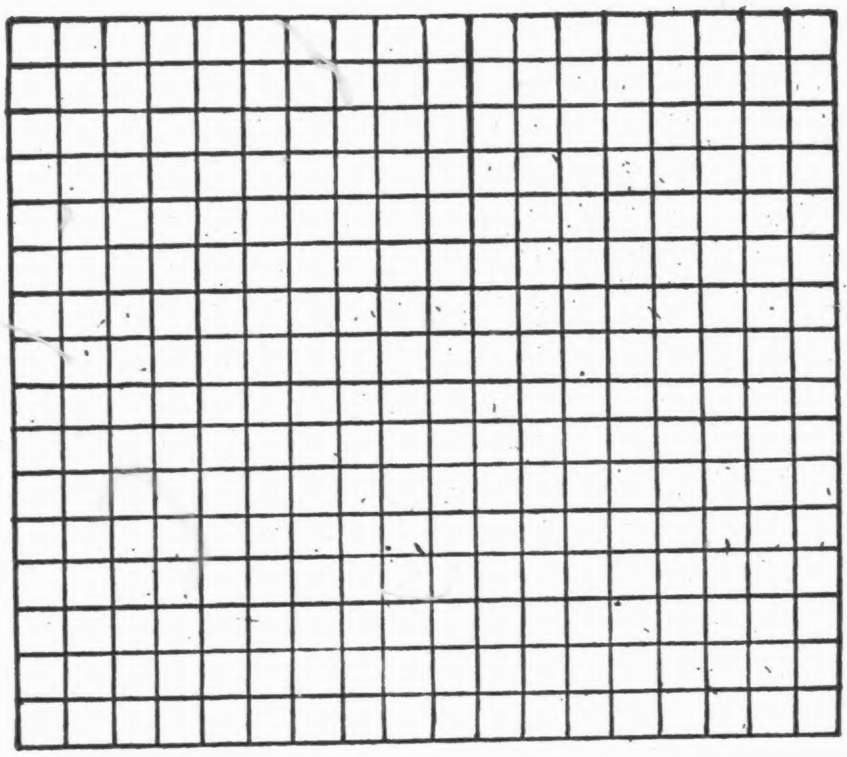
Place the cut-out shape on the graph paper which is printed at the end of this question. Hold it flat. Use a sharp pencil to draw a thin line round the shape as close as you can to its edge. The pencil should be touching the edge of the cut-out shape all the time as you draw round it.

1. Count the number of complete squares inside the outline and circle the letter corresponding to the number you obtain. The number of complete squares inside the outline is between

   A. 67 and 76
   B. 77 and 86
   C. 87 and 96
   D. 97 and 106
   E. 107 and 116

2. Count the number of part squares inside the outline and circle the letter corresponding to the number you obtain. The number of part squares inside the outline is between

   A. 35 and 44
   B. 45 and 54
   C. 55 and 64
   D. 65 and 74
   E. 75 and 84



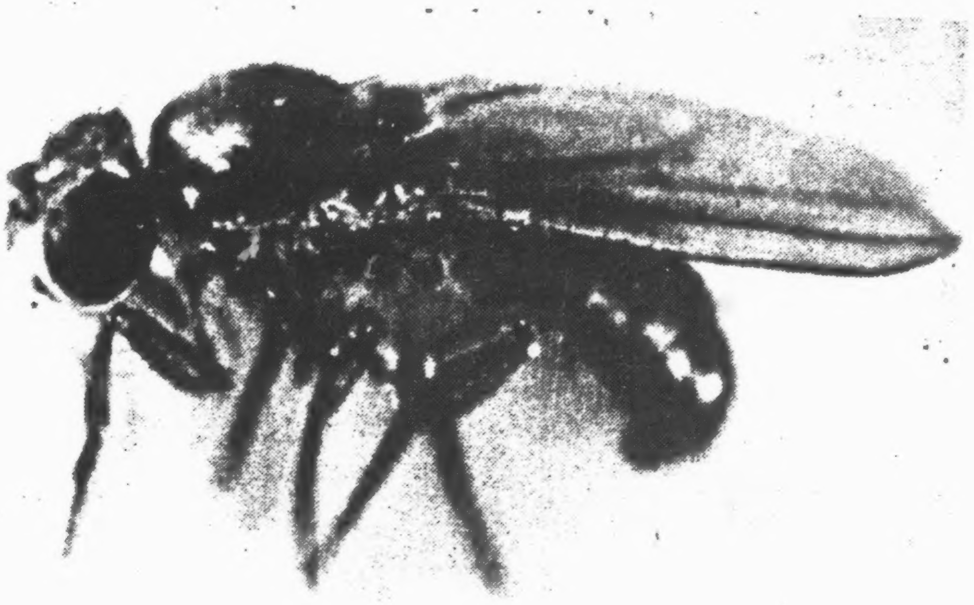
3. Add the number of complete squares which you counted for question 1, to half the number of part squares you counted for question 2. Circle the letter corresponding to the resulting sum.

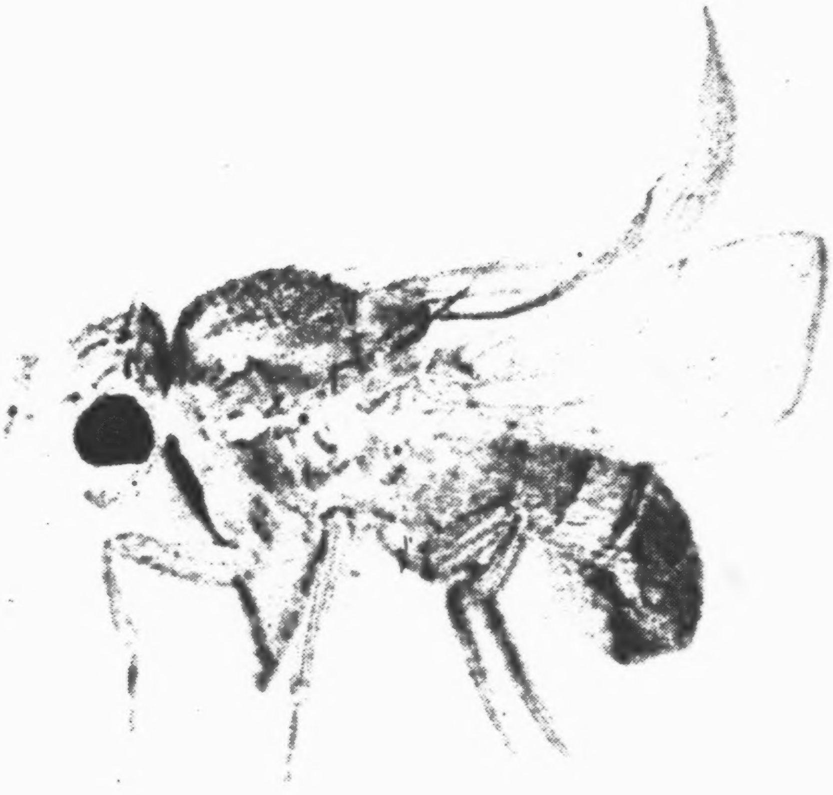
The resulting sum, which represents the area of the leaf shape is between

A. 121 and 125 square units
B. 126 and 130 square units
C. 131 and 135 square units
D. 136 and 140 square units
E. 141 and 145 square units

Leave your cut-out shape pinned to the graph paper.

The photographs show two fruit flies of the same species. Photograph 1 is of a normal fly and photograph 2 shows a fly that had developed from an egg which had been irradiated before it hatched.





4. Which one of the following lists gives only the features in which the two flies appear different?

   A. Number of joints in the legs, body colour, eyes.
   B. Size of head, number of joints in the legs, body colour.
   C. Length of the thorax, eyes, shape of wings.
   D. Size of head, length of thorax, body colour.
   E. Eyes, shape of the wings, body colour.

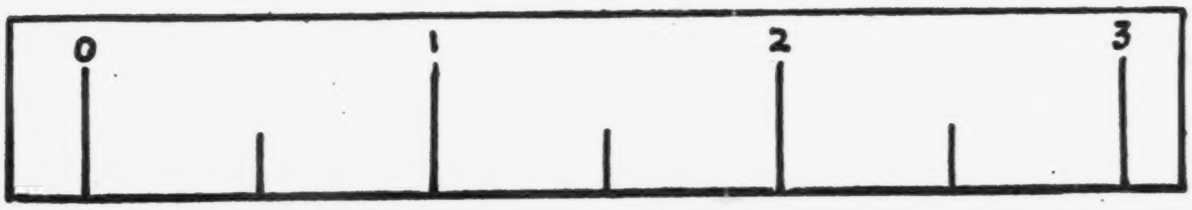
In question 5 select from the following list of observations those which you believe are most appropriate to the experiments which you are asked to carry out.

A. Solid dissolves
B. Solid does not dissolve
C. Black precipitate forms
D. White precipitate forms
E. Red-brown precipitate forms
F. Green-grey precipitate forms
G. Precipitate dissolves later
H. Precipitate does not dissolve
I. Colourless solution forms
J. Greenish yellow solution forms
K. White needle-shaped crystals form
L. No residue
M. Black residue
N. Pale yellow residue
O. Colourless droplets form
P. White steamy fumes evolved
Q. Solid sublimes
R. Pungent gas evolved
S. Brown gas evolved
T. Green-yellow gas evolved
U. Inflammable gas evolved
V. Gas evolved which relights a glowing splint

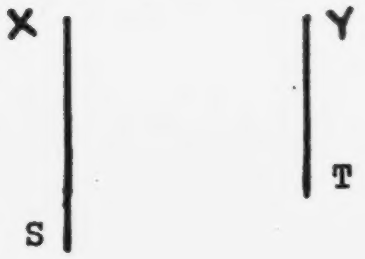
5. Add dilute sodium hydroxide solution slowly to each of tubes X, Y and Z until it is present in excess in each case. Complete the following table for each tube; one letter selected from A to V above is to appear in each blank space, each pair representing what you think are the two most appropriate observations in each case.

Tube	Observations	
X		
Y		
Z		

Questions 6, 7 and 8 refer to the printed scale shown below.



Cut out the scale and use it to measure the distance between the ends, X and Y, of the two lines drawn below.



6. The distance between the two ends is

   A. 0.7 scale units
   B. 0.73 scale units
   C. 0.75 scale units
   D. 0.77 scale units
   E. 0.8 scale units

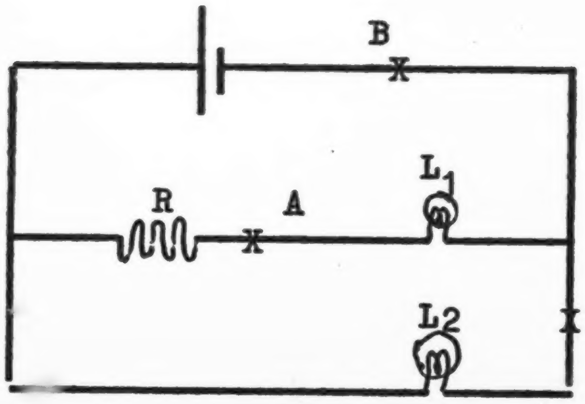
7. The unreliability of the measurement just given is

   A. 0.1
   B. 0.07
   C. 0.05
   D. 0.03
   E. 0.01

8. It is suspected that the paper scale you have used shrinks and expands with atmospheric humidity, that is the amount of moisture in the air. The best way to investigate whether or not this happens would be to

   A. measure the distance between the two ends referred to in 6 every day for a month and see how the result varied.
   B. soak the scale in water and check its length against a metal ruler.
   C. check the length of the scale against a wooden ruler.
   D. soak the scale in water and check its length against a wooden ruler.
   E. check the length of the scale each day for a month against a metal ruler.

9. Set up the circuit as shown in the diagram from the apparatus provided.



By inserting the ammeter at position A, B, or C in the circuit measure the following and record your results in the spaces provided.

I. The current taken from the accumulator ____________

II. The current through L_1 ____________________

III. The current through L_2 ____________________

END OF BOOKLET 19

I. E. A.

IEA/20

BOOKLET 20

SCIENCE PRACTICAL IV

POPULATION IV SCIENCE PRACTICAL (National Option)

This test is concerned with some of the practical abilities that are important in science, such as being able to read instructions and carry out simple manipulations, to observe accurately and record observations in an appropriate way, and to select the best method and equipment for a particular purpose.

The questions will ask you to carry out instructions and to observe and record the results.

In most questions you are asked to choose the best answer from a number of alternatives and to circle the letter corresponding to it.

Here is an example.
Which one of the following would you use to weigh a large crystal of copper sulphate to an accuracy of 0.01 gram?

A. A measuring cylinder
B. A compression spring balance reading in 0.5 Kg to 10.0 Kg
C. A set of household (kitchen) scales
[✓ D.] A chemical balance
E. A milliammeter

A measuring cylinder is used to measure volume, not weight. Similarly, a milliammeter is used to measure small electric currents. Hence we are left with B, C and D, all of which are used for measuring weight. But, of these, only the chemical balance would be capable of weighing a crystal to 0.01 gram, so that is the correct answer and the D should be circled as shown.

In these questions you will have to make measurements or other observations and record the results in a different way. All you have to do is to follow the instructions carefully.

You will have plenty of time, so do not hurry. But you will have to plan your work and to organise your time efficiently as, of course, the ability to do this is an important part of laboratory work.

Do not waste time on questions you do not understand or cannot do. Leave them and pass on to the next ones; you can always come back to those you leave later if there is time.

Questions 1 to 5 refer to the following experiment which you are required to do.

You are provided with a small quantity of organism F, a beaker of warm water (roughly 45°C), and three labelled tubes. One of these tubes contains a liquid that is poisonous to the organism, one contains a nutrient solution and the third contains distilled water but you are not told which.

Read carefully through the whole of the question before you begin work.

Divide the sample of organism F into three approximately equal portions. Place one portion in each of the tubes P, Q and R. Shake each tube vigorously for a few seconds so that the organisms are evenly dispersed in the liquid. (It is best to place your thumb over the mouth of the tube while doing this, but wipe it dry before moving from one tube to another).

Stand all three tubes in the beaker of warm water.

Shake the tubes gently occasionally but take care that none of the mixture spills out. After five minutes examine each tube.

Select from the following list of observations the one which you think best describes what you observed in each case.

A. No observable change occurred in the solution.
B. The solution became hot.
C. Gas bubbles were produced.
D. Gas bubbles were produced and the solution markedly changed colour.
E. The solution became hot and gas bubbles were produced.

1. The statement that best describes what happened in tube P is

A. B. C. D. E.

2. The statement that best describes what happened in tube Q is

A. B. C. D. E.

3. The statement that best descibes what happened in tube R is

A. B. C. D. E.

Now take tube Q and put half its contents into tube P and half into tube R. Again stand the tubes in the warm water in the beaker, shaking them gently occasionally. After five minutes examine the contents.

4. The statement that best describes what has now happened in tube P is

A. B. C. D. E.

5. The statement that best describes what has now happened in tube R is

A. B. C. D. E.

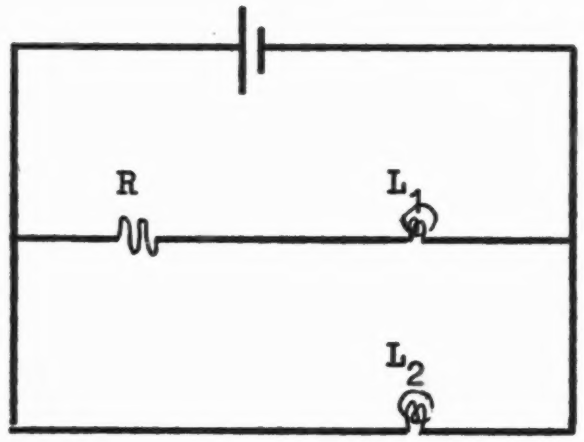
In question 6 select from the following list of observations those which you believe are most applicable to the experiments which you are asked to carry out:

A. Solid dissolves
B. Solid does not dissolve
C. Black precipitate forms
D. White precipitate forms
E. Red-brown precipitate forms
F. Green-grey precipitate
G. Precipitate dissolves later
H. Precipitate does not dissolve
I. Colourless solution forms
J. Greenish yellow solution forms
K. White needle-shaped crystals form
L. No residue
M. Black residue
N. Pale yellow residue
O. Colourless droplets form
P. White steamy fumes evolved
Q. Solid sublimes
R. Pungent gas evolved
S. No gas evolved
T. Green-yellow gas evolved
U. Inflammable gas evolved
V. Gas evolved which relights a glowing splint

6. Heat separately each of the substances α and β with liquid W until no further change occurs and then cool. Do not boil. Use about as much of α or β as will pile on this circle ○ and about 0.5 cm^3 of W. Complete the following table for both α and β. 4 letters selected from A to V above are to appear in each blank space, representing what you think are the 4 most appropriate observations in each case.

Substance treated with solution W	Observations
α	
β	

7. Set up the circuit as shown in the diagram from the apparatus provided.



Using the voltmeter or the ammeter as necessary, measure the following and record your results in the spaces provided.

I The voltage across L_1 ____________
II The voltage across L_2 ____________
III The voltage across R ____________
IV The voltage across the accumulator ____________
V The current taken from the accumulator ____________
VI The current through L_1 ____________
VII The current through L_2 ____________

END OF BOOKLET 20

I. E. A.

IEA/21

BOOKLET 21

BIOLOGY PRACTICAL IV

POPULATION IV BIOLOGY PRACTICAL (National Option)

This test is concerned with some of the practical abilities that are important in science, such as being able to read instructions and carry out simple manipulations, to observe accurately and recordobservations in an appropriate way, and to select the best method and equipment for a particular purpose.

The questions will ask you to carry out instructions and to observe and record the results.

In most questions you are asked to choose the best answer from a number of alternatives and to circle the letter corresponding to it.

Here is an example.
Which one of the following would you use to weigh a large crystal of copper sulphate to an accuracy of 0.01 gram?

A. A measuring cylinder
B. A compression spring balance reading in 0.5 Kg to 10.0 Kg
C. A set of household (kitchen) scales
[✓ D.] A chemical balance
E. A milliammeter

A measuring cylinder is used to measure volume, not weight. Similarly, a milliammeter is used to measure small electric currents. Hence we are left with B,C and D, all of which are used for measuring weight. But, of these, only the chemical balance would be capable of weighing a crystal to 0.01 gram, so that is the correct answer and the D should be circled as shown.

In these questions you will have to make measurements or other observations and record the results in a different way. All you have to do is to follow the instructions carefully.

You will have plenty of time, so do not hurry. But you will have to plan your work and to organise your time efficiently as, of course, the ability to do this is an important part of laboratory work.

Do not waste time on questions you do not understand or cannot do. Leave them and pass on to the next ones; you can always come back to those you leave later if there is time.

Questions 1 to 5 refer to the following experiment which you are required to do.

You are provided with a small quantity of organism F, a beaker of warm water (roughly 45° C), and three labelled tubes. One of these tubes contains a liquid that is poisonous to the organism, one contains a nutrient solution and the third contains distilled water but you are not told which.

Read carefully through the whole of the question before you begin work.

Divide the sample of organism F into three approximately equal portions. Place one portion in each of the tubes, P, Q and R. Shake each tube vigorously for a few seconds so that the organisms are evenly dispersed in the liquid. (It is best to place your thumb over the mouth of the tube while doing this, but wipe it dry before moving from one tube to another.)

Stand all three tubes in the beaker of warm water.

Shake the tubes gently occasionally but take care that none of the mixture spills out. After five minutes examine each tube.

Select from the following list of observations the one which you think best describes what you observed in each case.

A. No observable change occurred in the solution
B. The solution became hot
C. Gas bubbles were produced
D. Gas bubbles were produced and the solution markedly changed colour
E. The solution became hot and gas bubbles were produced

1. The statement that best describes what happened in tube P is

A. B. C. D. E.

2. The statement that best describes what happened in tube Q is

A. B. C. D. E.

3. The statement that best describes what happened in tube R is

A. B. C. D. E.

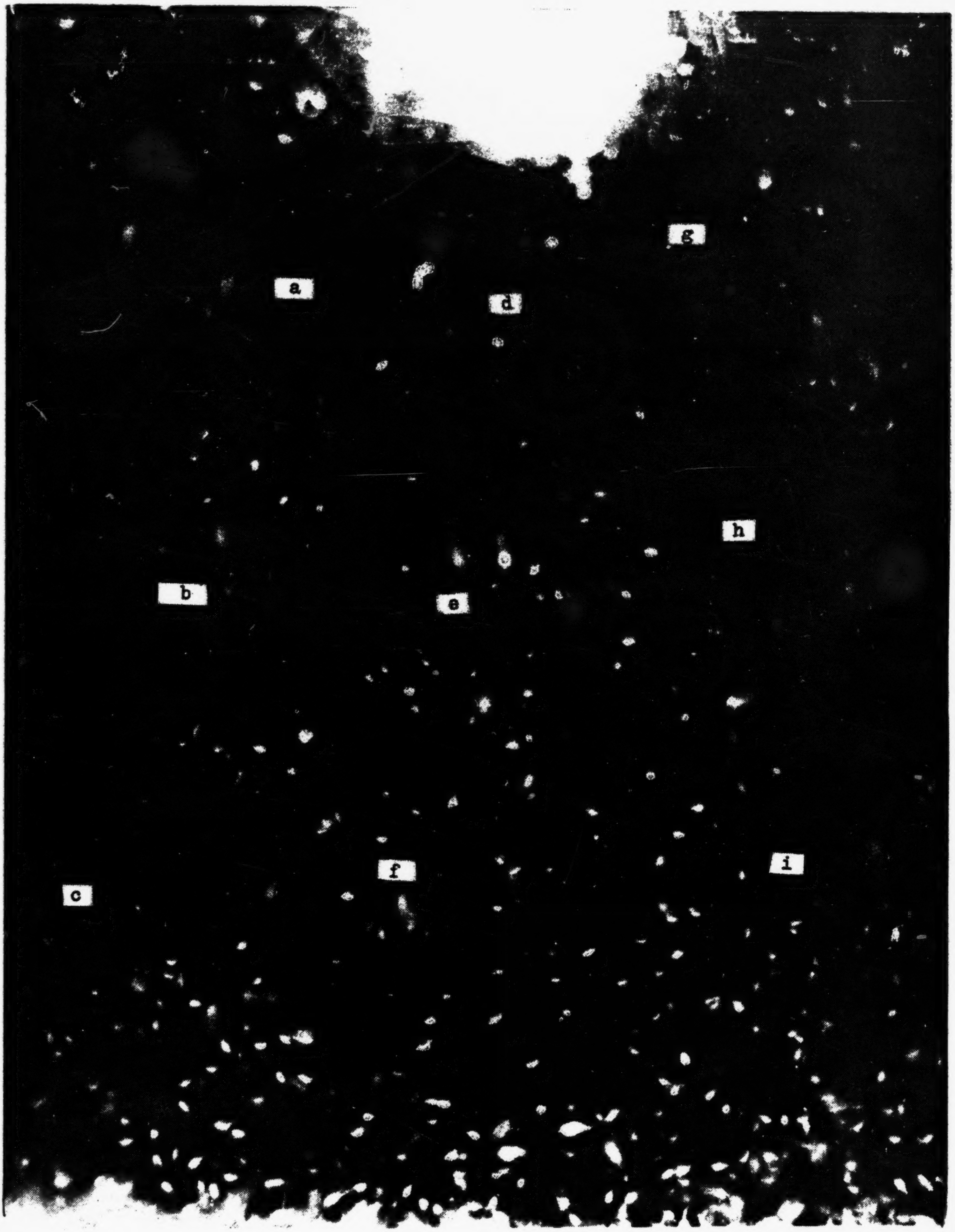
Now take tube Q and put half its contents into tube P and half into tube R. Again stand the tubes in the warm water in the beaker, shaking them gently occasionally. After five minutes examine the contents.

4. The statement that best describes what has now happened in tube P is

   A. B. C. D. E.

5. The statement that best describes what has now happened in tube R is

   A. B. C. D. E.


g
a
d
h
b
e
f
i
c

Questions 6, 7 and 8 refer to the photograph.

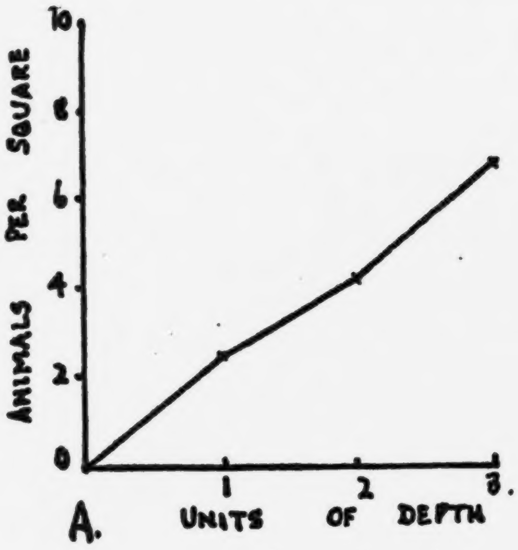
The photograph on page 3 shows the distribution of small organisms in a container of water when illuminated from above by a bright source of light.

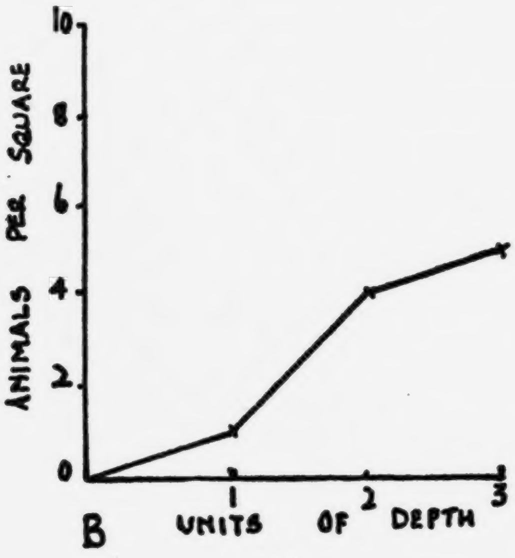
6. In order to obtain the best estimate of the numbers of organisms at different light intensities it would be necessary to count the numbers present per unit area on the photograph at the following positions: (circle one)

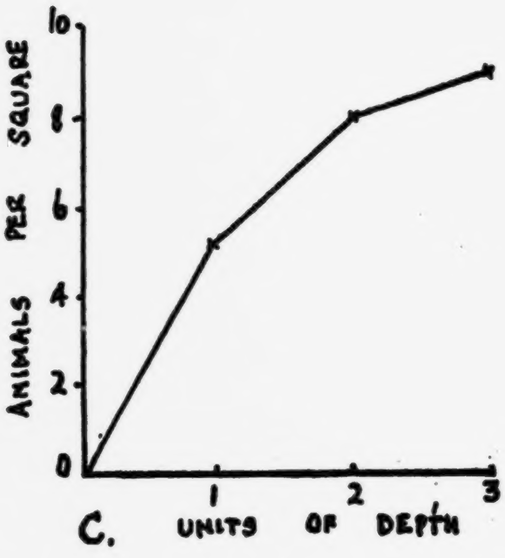
   A. Either points a, b and c, or points d, e and f or points g, h and i.
   B. At three points chosen at random from a, b, c, d, e, f, g, h, or i.
   C. Along the diagonals points a, e, and i, or points g, e, and c, that is, across the rows but at different distances from the light source.
   D. At positions a, d and g; positions b, e and h and at positions c, f, and i.
   E. None of these.

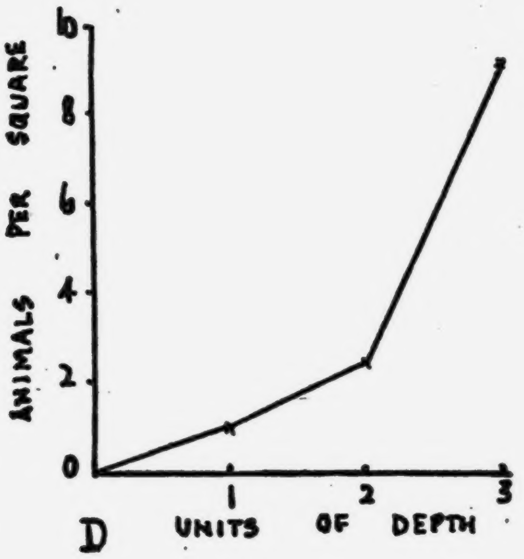
7. Cut a 2.5 cm square hole in a piece of paper.
   Place the top left-hand corner of the square hole against the bottom right-hand corner of the label b on the photograph so that the sides of the hole are parallel to the sides of photograph. Count the number of organisms in the square hole. (N.B. Any light spot is an individual animal).
   Repeat this process at positions e and h.
   The average number of animals per 2.5 cm square of photograph at these points is

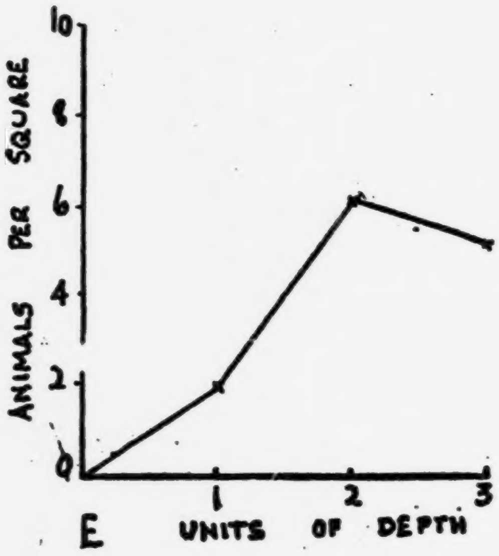
   A. 3.
   B. 5.
   C. 7.
   D. 9.
   E. 12.


A.


B


C.


D

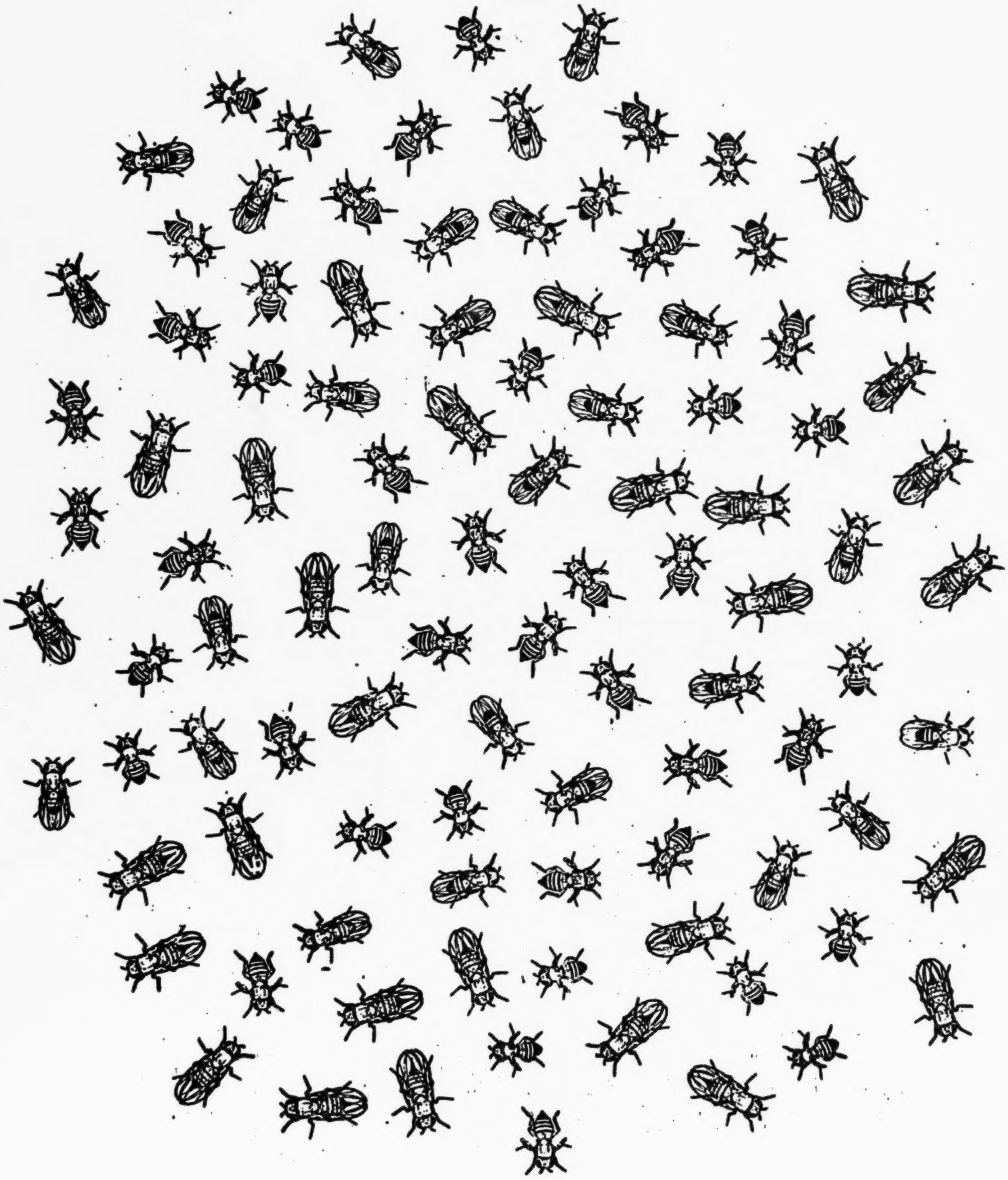

E

8. Which of the above graphs most accurately represents the variation of density of animals (measured as number of animals per unit area) at different depths. The position of a is at 1 unit of depth, the position of b at 2 units of depth and the position c at 3 units of depth.

   A. Graph A
   B. Graph B
   C. Graph C
   D. Graph D
   E. Graph E

Questions 9, 10 and 11 refer to the photograph of different fruit flies.

Examine the photograph carefully and you will see that there are four types, each of which can be distinguished from all the others by a combination of features. Select what these combinations are from the three sets of lists, one each from questions 9, 10 and 11.

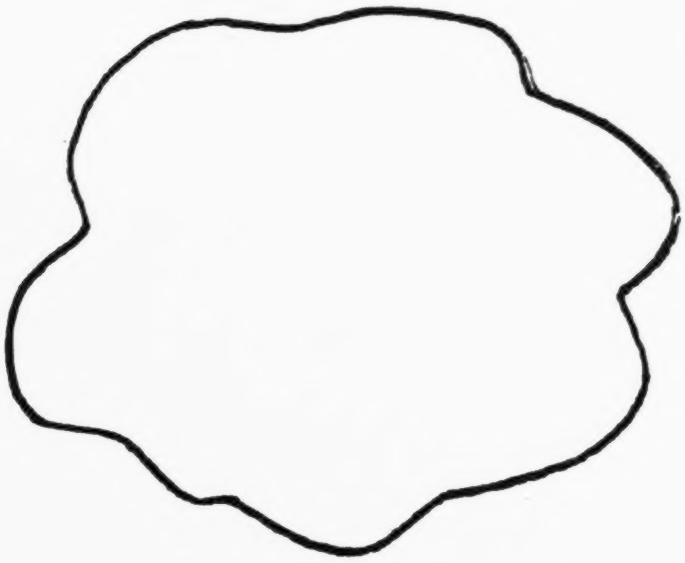


9. A. Black tip to abdomen + stripes on abdomen
   B. Small wings + stripes on abdomen
   C. Rounded tip to abdomen + two stripes on abdomen
   D. Rounded tip to abdomen + small wings
   E. Pointed tip to abdomen + four stripes on abdomen

10. A. Distinct head + two eyes
    B. Two stripes on abdomen + pointed abdomen
    C. Two stripes on abdomen + large wings
    D. Four stripes on abdomen + pointed abdomen
    E. Large wings + three pairs of legs

11. A. Large wings + four stripes on abdomen
    B. Four stripes on abdomen + two eyes
    C. Black eyes + rounded abdomen
    D. Wings with veins + rounded abdomen
    E. Three pairs of legs + two stripes on abdomen

Questions 12, 13, 14 and 15 refer to the following outline shape.



The outline shown above represents a leaf, the area of which is to be determined.

Using the scissors provided, cut out the shape very carefully so that the cut-out has a thin black margin all round the edge.

Place the cut-out shape on the graph paper which is printed at the end of this question. Hold it flat. Use a sharp pencil to draw a thin line round the shape as close as you can to its edge. The pencil should be touching the edge of the cut-out shape all the time as you draw round it.

12. Count the number of complete squares inside the outline and circle the letter corresponding to the number you obtain. The number of complete squares is between

A. 67 and 76
B. 77 and 86
C. 87 and 96
D. 97 and 106
E. 107 and 116

13. Count the number of part squares inside the outline and circle the letter corresponding to the number you obtain. The number of part squares inside the outline is between

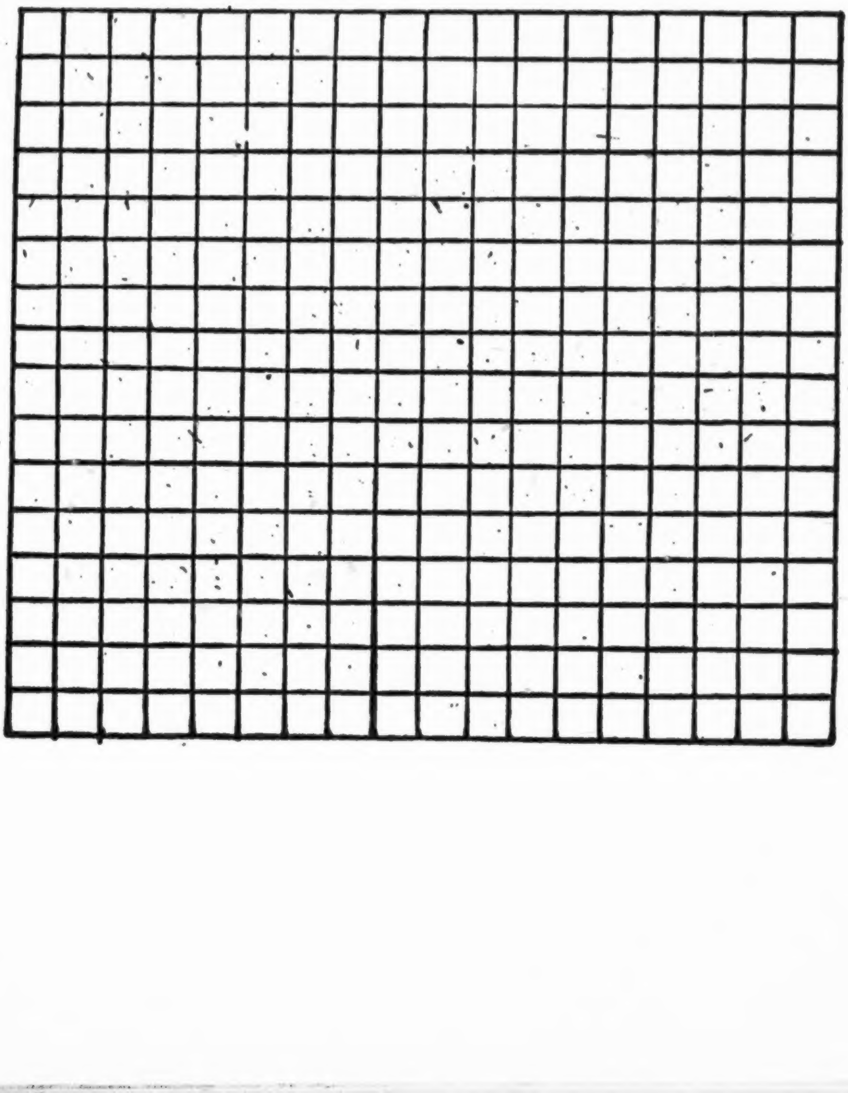
A. 35 and 44
B. 45 and 54
C. 55 and 64
D. 65 and 74
E. 75 and 84

14. Add the number of complete squares which you counted for question 12, to half the number of part squares you counted for question 13. Circle the letter corresponding to the resulting sum.

The resulting sum, which represents the area of the leaf shape is between

A. 121 and 125 square units.
B. 126 and 130 square units.
C. 131 and 135 square units.
D. 136 and 140 square units.
E. 141 and 145 square units.

Leave your cut-out shape pinned to the graph paper.



15. In which of the following investigations would the general technique for measuring the areas of leaves used above, adapted where necessary, not be appropriate?

- A. Testing the hypothesis that plants growing in partial shade have larger leaf areas than plants of the same species growing in sunny positions.
- B. Determining the average number of stomata per unit area of a leaf.
- C. Measuring the rate of loss of water per unit area of leaf surface due to transpiration.
- D. Comparing the rate of loss of water due to transpiration between leaves with waxy cuticles and leaves without waxy cuticles.
- E. Studying the rate of growth of a given leaf on a living plant.

END OF BOOKLET 21

I. E. A.

IEA/22

BOOKLET 22

CHEMISTRY PRACTICAL IV

IEA/22

POPULATION IV CHEMISTRY PRACTICAL (National Option)

This test is concerned with some of the practical abilities that are important in science, such as being able to read instructions and carry out simple manipulations, to observe accurately and record observations in an appropriate way, and to select the best method and equipment for a particular purpose.

The questions will ask you to carry out instructions and to observe and record the results.

In most questions you are asked to choose the best answer from a number of alternatives and to circle the letter corresponding to it.

Here is an example.
Which one of the following would you use to weigh a large crystal of copper sulphate to an accuracy of 0.01 gram?

A. A measuring cylinder
B. A compression spring balance reading in 0.5 Kg to 10.0 Kg
C. A set of household (kitchen) scales
[✓ D.] A chemical balance
E. A milliammeter

A measuring cylinder is used to measure volume, not weight. Similarly, a milliammeter is used to measure small electric currents. Hence we are left with B, C and D, all of which are used for measuring weight. But, of these, only the chemical balance would capable of weighing a crystal to 0.01 gram, so that is the correct answer and the D should be circled as shown.

In these questions you will have to make measurements or other observations and record the results in a different way. All you have to do is to follow the instructions carefully.

You will have plenty of time, so do not hurry. But you will have to plan your work and to organise your time efficiently as, of course, the ability to do this is an important part of laboratory work.

Do not waste time on questions you do not understand or cannot do. Leave them and pass on to the next ones; you can always come back to those you leave later if there is time.

In questions 1, 2 and 3 select from the following list of observations those which you believe are most appropriate to the experiments which you are asked to carry out.

A. Solid dissolves
B. Solid does not dissolve
C. Black precipitate forms
D. White precipitate forms
E. Red-brown precipitate forms
F. Green-grey precipitate forms
G. Precipitate dissolves later
H. Precipitate does not dissolve
I. Colourless solution forms
J. Greenish yellow solution forms
K. White needle-shaped crystals form
L. No residue
M. Black residue
N. Pale yellow residue
O. Colourless droplets form
P. White steamy fumes evolved
Q. Solid sublimes
R. Pungent gas evolved
S. Brown gas evolved
T. Green-yellow gas evolved
U. Inflammable gas evolved
V. Gas evolved which relights a glowing splint

1. Heat separately each of the substances $\underline{\alpha}$ and $\underline{\beta}$ with liquid W until no further change occurs and then cool. Do not boil. Use about as much of $\underline{\alpha}$ or $\underline{\beta}$ as will pile on this circle ◯ and about 0.5 cm^3 of W. Complete the following table for both $\underline{\alpha}$ and $\underline{\beta}$; $\underline{4}$ letters selected from A to V above are to appear in each blank space, representing what you think are the $\underline{4}$ letters appropriate observations in each case.

Substance treated with solution W	Observations
α	
β	

2. Heat solid substance γ carefully in an ignition tube until no further change occurs. Use about the quantity of crystals which would pile on this circle

Circle the four most appropriate letters which represent your observations, that is 4 of the following letters should be circled.

A B C D E F G H I J K

L M N O P Q R S T U V

3. Add dilute sodium hydroxide solution slowly to each of tubes X, Y and Z until it is present in excess in each case. Complete the following table for each tube; one letter selected from A to V above is to appear in each blank space, each pair representing what you think are the two most appropriate observations in each case.

Tube	Observations	

END OF BOOKLET 22

I. E. A.

IEA/23

BOOKLET 23

PHYSICS PRACTICAL IV

IEA/23

POPULATION IV PHYSICS PRACTICAL (National Option)

This test is concerned with some of the practical abilities that are important in science, such as being able to read instructions and carry out simple manipulations, to observe accurately and record observations in an appropriate way, and to select the best method and equipment for a particular purpose.

The questions will ask you to carry out instructions and to observe and record the results.

In most questions you are asked to choose the best answer from a number of alternatives and to circle the letter corresponding to it.

Here is an example.
Which one of the following would you use to weigh a large crystal of copper sulphate to an accuracy of 0.01 gram?

A. A measuring cylinder
B. A compression spring balance reading in 0.5 Kg to 10.0 Kg
C. A set of household (kitchen) scales
[✓ D.] A chemical balance
E. A milliammeter

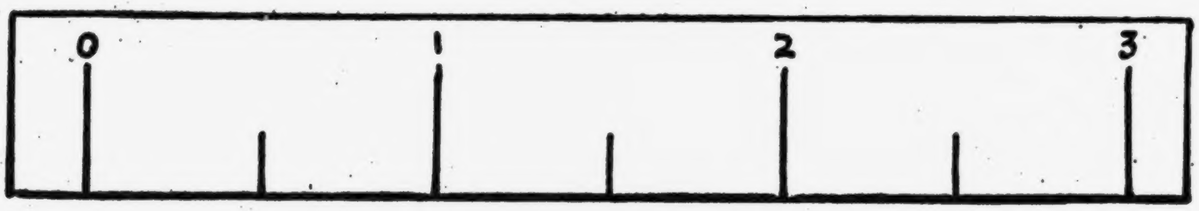
A measuring cylinder is used to measure volume, not weight. Similarly, a milliammeter is used to measure small electric currents. Hence we are left with B, C and D, all of which are used for measuring weight. But, of these, only the chemical balance would be capable of weighing a crystal to 0.01 gram, so that is the correct answer and the D should be circled as shown.

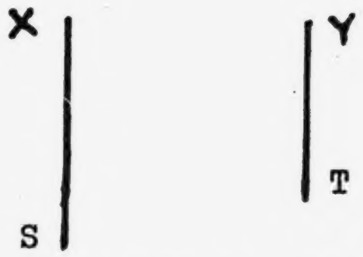
In these questions you will have to make measurements or other observations and record the results in a different way. All you have to do is to follow the instructions carefully.

You will have plenty of time, so do not hurry. But you will have to plan your work and to organise your time efficiently as, of course, the ability to do this is an important part of laboratory work.

Do not waste time on questions you do not understand or cannot do. Leave them and pass on to the next ones; you can always come back to those you leave later if there is time.

Questions 1, 2, 3 and 4 refer to the printed scale shown below.





Cut out the scale and use it to measure the distance between the ends, X and Y, of the two lines drawn above.

1. The distance between the two ends is

   A. 0.7 scale units
   B. 0.73 scale units
   C. 0.75 scale units
   D. 0.77 scale units
   E. 0.8 scale units

2. The unreliability of the measurement just given is

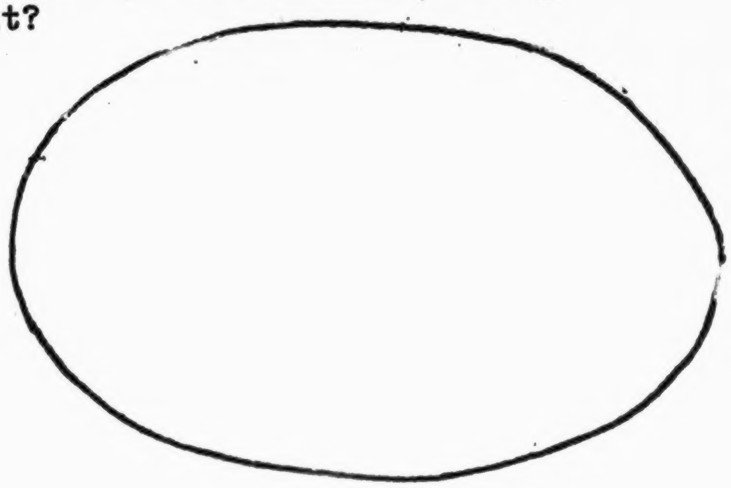
   A. 0.1
   B. 0.07
   C. 0.05
   D. 0.03
   E. 0.01

3. It is suspected that the paper scale you have used shrinks and expands with atmospheric humidity, that is the amount of moisture in the air. The best way to investigate whether or not this happens would be to

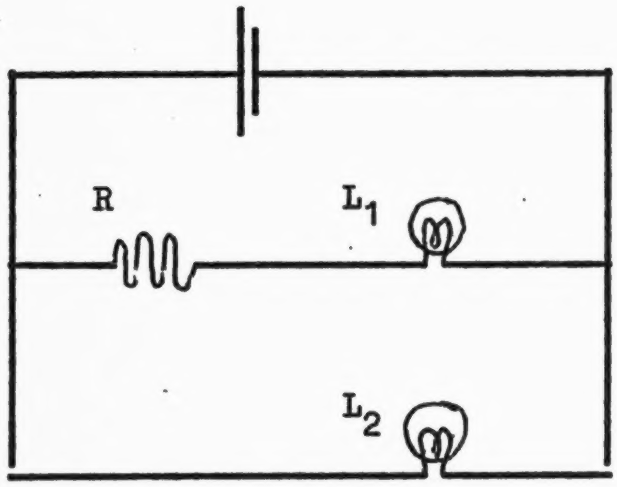
   A. measure the distance between the two ends referred to in the question every day for a month and see how the result varied.
   B. soak the scale in water and check its length against a metal ruler.
   C. check the length of the scale against a wooden ruler.
   D. soak the scale in water and check its length against a wooden ruler.
   E. check the length of the scale each day for a month against a metal ruler.

4. Which of the given areas do you consider to be the best estimate of the area enclosed by this outline, using the scale you have cut out?

A. 1.5 square units
B. 2.0 square units
C. 2.5 square units
D. 3.0 square units
E. 3.5 square units



5. Set up the circuit as shown in the diagram from the apparatus provided



Using the voltmeter or the ammeter as necessary, measure the following and record your results in the spaces provided.

I The voltage across L_1 ____________
II The voltage across L_2 ____________
III The voltage across R ____________
IV The voltage across the accumulator ____________
V The current taken from the accumulator ________
VI The current through L_1 ____________
VII The current through L_2 ____________

Using the apparatus provided set up a simple pendulum with a length of 56 cm. Now find the period of oscillation of the pendulum. The period of oscillation is the time it takes to make one complete swing, that is from one extreme of the swing to the other, and back again. It can also be taken from the time the pendulum passes through its central position until it passes through this position again moving in the same direction.

You have 20 minutes to choose one of the following methods and to complete the experiment and you should use the most accurate and reliable method of finding the period of oscillation within this available time.

Method A. Find the time of 25 swings. Repeat this process as many times as possible and work out the average time for one swing from the results.

Method B. Find the number of swings in one minute. Repeat as many times as possible and work out the time for one swing from the results.

Method C. Find the time for 100 swings. Repeat this a second time and then work out the average time for one swing.

Method D. Find the time for 1 swing. Repeat this 50 times, and then work out the average time for one swing.

Method E. Find the number of swings in 3 minutes. Repeat this twice more and then work out the average time of a swing from the results.

6. Which method did you choose?

A. B. C. D. E.

7. Underline the value closest to that you obtained

1.00	1.02	1.04	1.06	1.08	sec.
1.10	1.12	1.14	1.16	1.18	"
1.20	1.22	1.24	1.26	1.28	"
1.30	1.32	1.34	1.36	1.38	"
1.40	1.42	1.44	1.46	1.48	"
1.50	1.52	1.54	1.56	1.58	"
1.60	1.62	1.64	1.66	1.68	"
1.70	1.72	1.74	1.76	1.78	"

END OF BOOKLET 23

SCIENCE SCORING KEYS

IEA/1A
IEA/1B
Booklet 1

Population I

Test 1A					Test 1B				
Item	Correct Response	Content Area	Behaviour Category	Source	Item	Correct Response	Content Area	Behaviour Category	Source
1*	A	1	A	1.11	1	D	1	A	4.11
2	B	1	B	2.12	2*	C	1	C	3.12
3	E	3	A	3.14) adapted	3	C	5	B	4.13
4	B	3	B	3.15)	4	C	-	C	2.10
5	A	3	B	3.16)	5	E	12	A	4.1
6	D	3	D	3.17)	6*	D	12	D	3.5
7*	D	12	C	4.2	7*	B	12	C	1.4
8*	B	13	B	2.5	8	C	13	B	3.4
9*	B	13	D	4.5	9	E	16	B	3.8
10	D	16	D	3.9	10	B	16	D	4.9
11	E	18	C	4.10	11	E	18	B	3.10
12*	C	23	A	1.16	12	A	30	A	4.17
13	E	30	A	1.13	13	B	33	A	2.16
14*	A	35	D	3.19	14	C	37	A	1.20
15	B	37	C	2.21	15*	C	37	B	4.20
16	D	39	B	3.20	16	C	39	D	1.21
17	A	40	B	2.23	17	E	41	B	4.23
18	C	42	A	1.23	18	C	42	D	2.24
19	D	45	A	4.25	19*	A	45	A	1.25
20	D	45	D	3.24	20	A	49	C	1.26

* anchor items with Population II

Classification Summary

	Total	A	B	C	D
Earth Science	9	3	3	2	1
Biology	13	1	5	3	4
Chemistry	4	4	-	-	-
Physics	14	4	4	2	4
Total	40	12	12	7	9

Test 4A **Population II** **Test 4B**

Item	Correct Response	Content Area	Behaviour Category	Source	Item	Correct Response	Content Area	Behaviour Category	Source
1	C	1	A	I/3/12(1)	1	A	1	C	I/1/11(1)
2	D	9	A	I/4/2(1)	2	C	13	D	II/8/6
3	A	12	A	II/3/1	3	D	12	D	I/3/5(1)
4	B	12	C	I/1/4(1)	4	B	13	B	I/2/5(1)
5	C	12	B	II/5/2	5	B	13	A	II/8/4
6	E	13	A	II/7/3	6	C	13	A	II/8/1(4)
7	D	13	C	II/5/8	7	A	13	B	II/7/4(4)
8	C	14	D	II/3/5	8	A	14	A	II/5/4
9	B	15	D	II/1/7	9	C	17	D	II/7/8
10	B	14	B	II/2/6(4)	10	C	16	A	II/3/7(4)
11	B	14	D	I/4/5(1)	11	E	23	A	II/4/9(1)
12	A	23	B	II/5/9(4)	12	C	23	D	II/4/11(4)
13	B	23	B	II/1/10	13	E	23	B	II/4/10
14	E	23	A	II/1/11	14	D	23	B	II/3/11
15	C	24	B	II/7/11	15	A	31	B	II/3/15(4S C)
16	A	26	B	II/8/11	16	E	26	A	II/3/12
17	C	23	C	II/2/10	17	B	28	A	II/1/13
18	A	31	A	II/3/14	18	D	30	C	II/8/13
19	A	31	D	II/6/15	19	A	26	B	II/2/13
20	D	31	D	II/6/18	20	D	31	A	II/4/14(4)
21	A	35	D	II/3/18(1)	21	B	35	D	II/8/17(4)
22	D	35	B	II/3/17	22	C	37	A	II/5/19(1)
23	B	37	B	II/5/18	23	C	37	D	II/7/18(4)
24	A	37	B	II/2/19	24	E	37	B	II/6/20
25	E	37	B	II/3/19	25	C	39	A	II/8/19
26	B	42	D	II/4/22(4)	26	A	45	A	I/1/25(1)
27	A	42	A	II/8/21	27	E	40	B	II/1/21
28	E	45	C	II/8/22	28	C	41	B	II/7/22
29	E	50	A	I/4/26	29	D	49	B	II/1/23(4)
30	A	49	C	II/6/24	30	D	49	D	II/8/24
Pencil and Paper Practical Items									
31	B		III	I/11(4)	31	C		III	II/6(4)
32	A		III	I/12(4)	32	C		III	II/7
33	E		III	II/16	33	B		III	II/8(4)

(continued)

(1) anchor items with Population I

(4) anchor items with Population IV

Item	Correct Response	Content Area	Behaviour Category	Source	Item	Correct Response	Content Area	Behaviour Category	Source
34	D		III	II/19(4)	34	E		III	II/10
35	C		III	I/18	35	B		I	I/15
36	C		III	I/19	36	E		I	I/17
37	E		III	II/23/(4)	37	C		III	II/21
38	C		III	I/29(4)	38	A		III	I/30(iv)
39	D		III	II/28(4)	39	C		III	I/30(v)
40	C		III	II/29(4)	40	A		III	I/30(vi)

Classification

Summary

	TEST 4A								TEST 4B								
Area	No.	A	B	C	D	I	II	III	No.	A	B	C	D	I	II	III	Total
Biology	10	3	2	2	3				9	4	2	0	3				19
Chemistry	9	2	4	1	2				10	4	4	1	1				19
Physics	11	3	4	2	2				11	3	4	1	3				22
Practical	10					0	0	10	10					2	0	8	20
Total	40	8	10	5	7	0	0	10	40	11	10	2	7	2	0	8	80
								Total	80	19	20	7	14	2	0	18	

(1) anchor items with Population I

(4) anchor items with Population IV

Population IV

Test 10A					Test 11B (P - U)				
Item No.	Correct Response	Content Area	Behaviour Category	Source	Item No.	Correct Response	Content Area	Behaviour Category	Source
1	E	9	C	IV 6-3	1*	C	9	A	1-3
2	D	12	A	2-3	2*	A	13	C	2-4
3	A	13	D	7-4	3	D	13	A	8-3
4	D	13	D	7-5	4	A	13	D	2-7
5	E	13	C	8-4	5*	B	14	A	3-3
6	A	15	C	3-7	6	C	16	C	1-6
7 *	C	16	D	3-5	7	C	18	D	6-6
8	E	18	A	3-6	8	E	20	A	1-7
9	B	23	B	1-9	9*	A	23/24	B	II-5-9
10	B	25	C	7-9	10	B	24	C	6-11
11	B	25	D	5-10	11*	C	23/24	D	II-4-11
12	A	27	A	7-10	12	D	25	D	3-10
13	A	27	B	7-11	13	D	26	A	5-9
14	E	27	B	7-12	14	D	29	B	8-10
15	E	33	B	5-11	15	E	29	C	2-11
16	D	36	A	5-13	16*	D	31	A	3-14
17	D	36	B	7-13	17	C	25	C	1-10
18*	C	37	B	4-13	18*	B	37	D	2-15
19	E	39	B	2-12	19	C	38	B	4-16
20	C	41	A	5-15	20	E	39	A	4-14
21*	D	49	B	6-15	21*	B	41	C	4-15
22	B	50	A	3-16	22	E	41	C	8-15
23	E	46	A	2-13	23	C	45	B	8-14
24	D	52	A	6-16	24	C	52	C	1-1
Pencil and Paper Practical Items					**Rotating Items (for categories and sources see IVS)**				
25*	B		III	I/11	25	C			
26*	A		III	I/12	26	E			
27	C		III	II/6	27	A			

* anchor items with Population II

Item	Correct Response	Content Area	Behaviour Category	Source	Item	Correct Response	Content Area	Behaviour Category	Source
Pencil and Paper Practical Items					Rotating Items (for categories and sources see IVS)				
28	B		III	II/8	28	E			
29	C		III	I/14	29	D			
30*	D		III	II/19	30	B			
31	A		III	II/20					
32	D		III	II/22					
33*	E		III	II/23					
34*	C		III	I/29					
35*	D		III	II/28					
36*	C		III	II/29					

Summary

Area	No.	A	B	C	D	I	II	III	No.	A	B	C	D	I	II	III	Total
Biology	8	2	0	3	3				8	4	0	2	2				16
Chemistry	7	1	4	1	1				9	2	2	3	2				16
Physics	9	5	4	0	0				7	1	2	3	1				16
Practical	12					0	0	12	(Rotating 6)							(Practical) (Rotating)	12 6
Total	36	8	8	4	4	0	0	12	30								
								Total	66	15	12	12	9	0	0	12	66

* anchor items with Population II

SCIENCE

Test 11 B - Rotated Sets P - U

	P		Q		R		S		T		U	
Item	Source	Correct Response	Source	Correct Response	Source	Correct Response	Source	Correct Response	Source	Correct Response	Source	Correct Response
25	B 5	C	B 7	C	C 7	C	P 8	C	P 32	C	P 40	C
26	B 31	E	B 40	E	C 35	E	P 14	E	P 13	E	P 10	E
27	C 4	A	C 9	A	B 22	A	C 12	A	C 32	A	C 39	A
28	C 19	E	C 31	E	P 33	E	C 23	E	B 29	E	B 18	E
29	P 6	D	P 15	D	B 13	D	B 33	D	C 2	D	C 36	D
30	P 20	B	P 25	B	P 19	B	B 20	B	B 35	B	B 32	B

Population IV S

Biology

Item	Correct Response	Content Area	Behaviour Category	Source		
1	B	7	A	3.1		
2	D	7	B	3.2		
3	B	7	B	3.3		
4	A	7	B	3.4		
5	C	7	A	2.3	*	a 25
6	E	11	D	1.6		
7	C	11	B	1.7	*	b 25
8	B	11	C	2.7		
9	D	11	C	2.8		
10	C	11	C	2.9		
11	E	11	C	3.7		
12	D	13	A	2.11		
13	D	13	C	1.12	*	c 29
14	B	13	C	1.23		
15	C	13	D	3.12		
16	D	14	A	3.6		
17	C	14	B	1.10		
18	E	14	A	3.8*		f 28
19	A	14	A	3.9		
20	B	14	B	4.11	*	d 30
21	C	14	D	4.12		
22	A	14	D	1.13	*	c 27
23	B	14	D	1.22		
24	C	14	D	3.14		
25	C	14	D	1.14		
26	A	15	B	4.14		
27	C	15	C	1.16		
28	A	15	C	2.16		
29	E	16	C	3.15	*	e 28
30	B	16	C	1.18		
31	E	16	D	3.24	*	a 26
32	B	20	C	3.17	*	f 30
33	D	22	D	4.18	*	d 29
34	D	22	D	3.21		
35	B	22	C	3.22	*	e 30
36	C	22	D	2.21		
37	A	20	D	4.18	*	
38	C	22	B	1.19	*	
39	C	22	B	1.20		
40	E	22	B	2.19	*	b 26

* Rotator items with Population IV

Classification Summary

		Total	A	B	C	D
I	Cell structure and function	11	2	4	4	1
II	Events on the level of a multicellular organism	17	4	3	4	6
III	Reproduction, Development, Population genetics and Evolutions	12	-	3	4	5
	Total	40	6	10	12	12

Population IV S

Chemistry

Item	Correct Response	Content Area	Behaviour Category	Source	
1	C	I 25	A	4.12	
2	D	25	A	4.3 *	c 29
3	D	25	A	3.3	
4	A	23	B	1.3 *	a 27
5	E	24	B	3.1	
6	B	25	B	3.4	
7	C	23	C	1.1 *	c 25
8	D	24	D	3.2	
9	A	II 27	A	2.6 *	b 27
10	A	34	A	2.22	
11	D	31	A	3.16	
12	A	31	B	1.17*	d 27
13	B	31	B	2.18	
14	A	27	B	4.6	
15	B	27	B	4.7	
16	B	31	B	4.15	
17	C	31	C	2.15	
18	D	34	C	2.16	
19	E	27	C	3.8 *	a 28
20	E	33	C	3.20	
21	D	34	D	1.23	
22	E	33	D	3.23	
23	E	27	D	2.7 *	d 28
24	B	27	D	2.8	
25	C	III 28	B	1.10	
26	B	28	B	1.11	
27	A	28	B	1.12	
28	C	28	B	2.9	
29	B	29	B	2.14	
30	D	29	C	4.11	
31	E	29	C	4.13 *	b 28
32	A	29	D	3.14 *	c 27
33	E	IV 30	A	1.14	
34	C	30	A	2.19	
35	E	30	B	2.20 *	c 26
36	D	33	B	4.19 *	f 29
37	E	33	B	4.20	
38	C	33	C	4.21	
39	A	26	D	1.6 *	f 27
40	B	33	D	4.22	

* Rotator items with Population IV

Classification Summary

		Total	A	B	C	D
I	Laws of chemical change including electro-chemistry	8	3	3	1	1
II	Atomic and molecular structure including periodic table	16	3	5	4	4
III	Reaction rate, equilibrium and energetics	8	-	5	2	1
IV	Descriptive processes, reaction	8	2	3	1	2
	Total	40	8	16	8	8

Population IV S

Physics

Item	Correct Response	Content Area	Behaviour Category	Source
1	A	I 35	A	1.1
2	B	35	C	3.2
3	E	36	B	2.3
4	E	38	D	2.6
5	C	38	C	3.5
6	D	38	D	3.7 * a 29
7	C	38	D	4.3
8	C	38	C	4.4 * d 25
9	D	39	C	2.8
10	E	39	C	4.5 * f 26
11	C	40	D	4.6
12	A	43	D	2.11
13	E	43	B	4.8 * e 26
14	E	II 44	A	4.9 * d 26
15	D	45	D	1.13 * b 29
16	D	46	A	1.14
17	C	46	B	1.15
18	D	46	C	2.13
19	B	46	A	3.13 * c 30
20	B	46	B	4.13 * a 30
21	C	47	A	3.15
22	B	47	A	4.14
23	A	47	C	4.15
24	C	III 48	B	1.16
25	B	48	C	1.17 * b 30
26	D	48	D	2.15
27	A	48	C	2.16
28	E	48	B	3.17
29	D	49	A	1.18
30	A	49	B	1.19
31	E	49	C	3.18
32	C	49	D	3.19 * e 25
33	E	50	D	1.20 * c 28
34	D	50	D	4.20
35	C	IV 51	D	1.21
36	C	51	B	2.20
37	D	51	B	3.22
38	E	52	B	2.22
39	B	52	A	2.21
40	C	52	D	4.22 *

* = Rotator items with IV

Classification Summary

		Total	A	B	C	D
I	Mechanics : Measurement, Forces Energy, Heat, Kinetic theory	13	1	2	5	5
II	Waves : Light, Sound, Spectra, Radiation	10	5	2	2	1
III	Electricity: Electrostatics, Circuits, Electromagnetism	11	1	3	3	4
IV	Modern Physics and Electronics	6	1	3	-	2
	Total	40	8	10	10	12

POPULATION II SCIENCE PRACTICAL (National Option)

Item	Correct Response	Behaviour Category	Source	Marks
1	D	I	I 1	1
2	A	I	I 2	1
3	A	I	I 3	1
4	E	I	I 7	1
5 X	E H	II	II 27	
Y	D G	II	II 27	
Z	D H	II	II 27	6
6	A	I	I 25	1
7	C	I	I 26	1
8	E	III	I 27	1
9	I = II + III	III	II 31	2 (If I = II + III within 20% score 2)
			Total	15

Summary of Behaviour Categories

	Practical	Pen and Paper	Totals
I	6	2	8
II	6	0	6
III	3	18	21
	15	20	35

POPULATION IV SCIENCE PRACTICAL (National Option)

Item	Correct Response	Behaviour Category	Source	Marks
1	A	II	2.1	1
2	C	II	2.2	1
3	A	II	2.3	1
4	C	II	2.4	1
5	A	II	2.5	1
6α	A I.K.S.	II	1.24	
β	A J.R.T.	II		8
7	II = I + III	III	2.31	1 If II = I + III within 20%
	II = IV or I + III = IV			1 If II = IV or I + III = IV (not both) within 20%
	V = VI + VII			1 If V = VI + VII within 20%

Total 16 x $\frac{9}{8}$ to bring to 18

Summary of Behaviour Categories

I	0	0	0
II	13	0	13
III	3	12	15
	16	12	28
	Practical	Pen and Paper	Total

POPULATION IV BIOLOGY PRACTICAL (National Option)

Item	Correct Response	Behaviour Category	Source	Marks
1	A	II	2.1	1
2	C	II	2.2	1
3	A	II	2.3	1
4	C	II	2.4	1
5	A	II	2.5	1
6	D	III	1.8	1
7	C	II	1.9	1
8	A	II	1.10	1
9	D	II	2.13	1
10	C	II	2.14	1
11	A	II	2.15	1
12	D	I	1.1	1
13	A	I	1.2	1
14	A	I	1.3	1
15	B	III	New	1
			Total	15 x $\frac{6}{5}$ to bring to 18, the same as chemistry and physics

Summary of Behaviour Categories

I	3	0	3
II	10	0	10
III	2	12	14
	15	12	27
	Practical	Pen and Paper	Total

POPULATION IV CHEMISTRY PRACTICAL (National Option)

Item	Correct Response	Behaviour Category	Source	Marks
1	A.I.K.S.	II	1.24	
	A.J.R.T.	II		8
2	N.R.S.V.	II	2.26	4
3X	E.H.	II	2.27	
Y	D.G.	II		
Z	D.H.	II		6
			Total	18

Summary of Behaviour Categories

	Practical	Pen and Paper	Total
I		0	0
II	18	0	18
III		12	12
	18	12	30

POPULATION IV PHYSICS PRACTICAL (National Option)

Item	Correct Response	Behaviour Category	Source	Marks	
1	A	I	1.25	1	
2	C	I	1.26	1	
3	E	III	1.27	1	
4	B	III	1.28	1	
5	II = I + III	III	2.31	1	If II = I + III within 20%
	II = IV or I + III = IV			1	If II = IV or I + III = IV (not both) within 20%
	V = VI + VII			1	If V = VI + VII within 20%
6	A	III	2.32	1	
7	1.48 to 1.52	II	2.33	1	

Total 9 x 2 to bring close to the biology and chemistry scores

Summary of Behaviour Categories

	Practical	Pen and Paper	Total
I	2	0	2
II	1	0	1
III	6	12	18
	9	12	21

INTERNATIONAL ASSOCIATION
for the
EVALUATION OF EDUCATIONAL ACHIEVEMENT
(I.E.A.)

PHASE II STAGE 2

MOTHER TONGUE TESTS

Reading Comprehension: Booklets 3, 7 and 14
Literature: Booklets 8, 9 and 18

December 1968

c/o UNESCO INSTITUTE FOR EDUCATION, HAMBURG

MOTHER TONGUE

This Bulletin includes the various booklets for Reading Comprehension and Literature for the IEA testing in Stage 2.

From the Contents Page overleaf you will see the booklets which appear here and their sections.

Where the same tests are given to two populations, these have not been reproduced a second time in this Bulletin, but a note has been inserted to the effect that the test is to be reproduced at a particular point in the booklet and a reference is made as to where to find the test.

All of the tests are to be found in this booklet except for the Student Questionnaires for Reading Comprehension and Literature, which are to be found in the Questionnaire Bulletin. Again, however, a reference is given at the appropriate point.

The scoring keys for the Reading Comprehension and Literature tests are given at the end of the Bulletin.

Care should be taken when printing the Reading Speed test (i.e. IEA/3J, which is the same as IEA/7J) that the first nine questions appear on the first page. The Reading Speed test is to be post-coded at the National Center and the instructions for the scoring and coding are given in Manual 1 (IEA/M1).

If you have any queries, please write to the Coordinator in Hamburg immediately.

I. E. A.

1.

IEA/3 C
3 D
3 P

BOOKLET 3

Reading Comprehension

Directions

This is a test to see how well you understand what you read. The test is made up of four stories with a number of questions on each. Read the first story and then answer the questions on it. Then go on to the second story and so on until you come to the end of Section C.

Each test item starts with a statement or question and then gives you four endings or answers. Pick the best ending or answer and blacken the space corresponding to the answer you have chosen on your answer card.

You may read the story over again as much as you need to. Try each question in turn. If you don't know the answer, you may leave it and go on to the next. Come back to it later if you have time.

You should answer even if you aren't sure of the right answer. However, do not guess blindly.

When you finish one story go ahead to the next. Keep going until you reach the end of Section C. If there is time left, go back through and try to do any that you skipped the first time through.

SECTION C

One of the most interesting birds I have seen is the Indian Tailor Bird. It is a small olive green bird that doesn't look at all unusual, yet it has a most unusual way of making its nest. The birds work together in pairs. First they find a leaf, the right size, and make holes along the edges with their beaks. Through these holes they thread grass. One bird pushes the thread from the outside, while the other bird sits in the nest and pushes it back until the edges of the leaf are sewn together to make a kind of bag, still hanging on the tree, in which the Tailor Bird lays its eggs.

1. What does the Tailor Bird use in place of thread?
   A. Grass.
   B. String.
   C. Spider web.
   D. Thorns.

2. The Tailor Birds are interesting because they
   A. are small and olive green in colour.
   B. live in pairs.
   C. make their nests in a special way.
   D. fly very fast.

3. The Tailor Bird got that name because it
   A. is a small bird.
   B. looks unusual.
   C. can sew.
   D. has a beak shaped like a needle.

4. The Tailor Birds make their nests
   A. from leaves.
   B. in a hole in a tree.
   C. in the tall grass.
   D. with the lining of grass.

5. The person who wrote about Tailor Birds was trying to
   A. give you some new information.
   B. tell you a story.
   C. get you to share his feelings.
   D. keep you guessing on how the story will come out.

Please continue

Once I watched a mother seal with twin babies for an hour or two and could have spent hours more observing them if time had permitted. Sometimes the two little animated balls of down would snuggle side by side and suckle together while their mother dozed. Then the little imps would play pranks on her, brushing and tickling her face with their flippers and nipping at her head and neck as they frisked and teased around her. She dozed with one eye held open, always keeping a watchful glance upon her offspring and now and again she would lift her head to regard them and to give a deep bay, which I could only interpret as an expression of unalloyed contentment with her happy lot.

Like a cow licking her calf, occasionally she would caress her babies, snuffling and nibbling, for seals are short-tongued creatures.

6. The mother kept watch over her babies while she rested by
   A. lifting her head to watch them.
   B. dozing with one eye open.
   C. caressing them fondly.
   D. suckling them.

7. The writer calls the baby seals "imps" because they
   A. did not like to stay still.
   B. liked to tease their mother.
   C. snuggled side by side.
   D. were small.

8. The writer says it is hard for the mother to lick the baby seals because
   A. they will not keep still.
   B. she has a short tongue.
   C. she goes to sleep.
   D. they tickle her face.

9. The writer thought that watching the seals was very
   A. exciting.
   B. useful.
   C. difficult.
   D. interesting.

10. The writer talks about the baby seals and their mother as if
   A. he had never actually seen them.
   B. they were lifeless.
   C. they were human.
   D. they were troublemakers.

Please turn over and continue.

Robert, standing in the stern, was confidently poling the punt over the waters of the narrow river that sunny afternoon, while Joan sat on the cushions facing him, trailing her hands in the cool water. Robert was proud of his skill, and was poling along with quite a flourish. The punt approached the lowest bridge on the river, where Robert knew he must bend low to avoid the arch. Alas! Though he bowed low, the pole stood upright, wedging itself in the mud of the river bed and against the arch of the bridge.

There was a brief struggle while Robert tried to decide whether to leave the pole and stay on the punt or accept the alternative. But the punt wouldn't wait for decisions and Robert was left clinging to the pole. Further and further into the mud the pole sank, while he climbed higher and higher to keep out of the water. Just when it seemed to the amused watchers that he must at last fall in, he was saved. Joan managed to paddle the punt back to his rescue.

11. When the pole started to sink into the mud, Robert
    - A. began to get wet.
    - B. called to Joan for help.
    - C. climbed up the pole.
    - D. climbed onto the bridge.

12. The punt had two things to make it go. These were a
    - A. pole and a paddle.
    - B. pole and a pair of oars.
    - C. pole and a motor.
    - D. paddle and a pair of oars.

13. When Robert has to "accept the alternative", the alternative was to
    - A. jump into the river.
    - B. stay in the boat.
    - C. have Joan save him.
    - D. hang onto the pole.

14. How did Joan feel about Robert's mishap?
    - A. we cannot tell.
    - B. she was amused.
    - C. she was embarassed.
    - D. she was angry.

15. The pole was held upright at the bridge by
    - A. only the mud on the river bottom.
    - B. only the arch of the bridge.
    - C. both the mud and the bridge.
    - D. Robert holding onto it.

16. We know that the river was not very deep because
    - A. Robert pushed the punt with a pole.
    - B. punts do not need much water.
    - C. the bridge was very low.
    - D. the bottom was muddy.

Please continue

For three or four thousand years a family of marmots had been settled in a grassy little valley under the cliffs of a jagged peak whose present name is the Rock of Wonders. The maps specify that the peak is about seven thousand two hundred feet in altitude.

The spot was a remarkably suitable one for all sorts of good reasons. In the first place, the slope faced south. The sun shone on it from dawn until dark, and in the spring the snow melted there faster than anywhere else. One could warm oneself as much as one wished, or again one could sit in the shade of huge rocks fallen from the heights of the mountain. A little way off a tiny spring fed a little lake. Thanks to this fresh spring, which never dried up, the grasses round about grew thick and strong, even in the month of August.

The rocks provided many sitting places and perfectly safe holes where one could take refuge in an emergency. As for the Family Cave, hollowed out many years ago by the grandfather of the present inhabitant, it opened out pleasantly from under a flat slab between two clumps of arnica. Since it had already been improved by two generations, it would have been difficult to find a drier and more comfortable apartment.

17. Why had the marmots lived so long in one place?
    A. They did not like to travel.
    B. They could not climb down the cliffs.
    C. They came there long ago.
    D. It was a very good place.

18. What kept the grasses in the valley green and healthy all summer?
    A. The warm sun.
    B. The melting snow.
    C. The high peak.
    D. A spring.

19. Why was it a good thing that the valley faced to the south?
    A. The summer days were warmer.
    B. Winter snows melted early.
    C. The best view was to the south.
    D. Marmots need a lot of sun.

20. From the story we know that marmots like to live in a home that is
    A. warm.
    B. light.
    C. dry.
    D. large.

21. The last sentence of the story makes us think that the marmots will
    A. make many new homes.
    B. continue to live in the Family Cave.
    C. have many babies.
    D. work hard to make the cave comfortable.

END OF SECTION C

DO NOT TURN OVER UNTIL YOU ARE TOLD
TO DO SO

SECTION D

The sundew is a small, pretty plant, that grows in damp, boggy places. Its leaves grow in clusters on slender reddish stems. On each leaf there are several beautiful shining drops that look like the smallest dewdrops you can imagine. A passing insect sees the drops and thinks they are drops of sweet nectar. He lights on the sundew's leaves. Surprise! The sticky drop is not nectar. It is the glue that the sundew uses to attract insects. The small leaves close over the insect. Soon the insect disappears, for the sundew is one of the strange plants that eat living insects.

1. Insects are most attracted to the sundew when they want to
   A. play.
   B. hide.
   C. rest.
   D. eat.

2. An insect lighting on a sundew disappears in the
   A. sunlight.
   B. sky.
   C. plant.
   D. bog.

3. When an insect that has lighted on a sundew disappears, it has
   A. been eaten.
   B. flown away.
   C. gone to sleep.
   D. fallen to the ground.

4. You would expect to find the sundew growing in places where it was
   A. cold.
   B. wet.
   C. high.
   D. grassy.

5. The sundew's leaves are
   A. slender.
   B. shining.
   C. in clusters.
   D. covered with dew.

Please continue

Ernenek slipped out of his sleeping bag. On top of his clothes made of small auk's skins, with the feathers inside, he put on other clothes made of bear skin, with the fur on the outside and pushed the trouser legs into his sealskin boots.

He came out of the narrow tunnel of the igloo on all-fours, pulling the half-asleep dog, who was the leader of the team, by its leash, while the other dogs followed yawning and shaking the rime off their thick fur. They clamoured for food by barking and showing their teeth which had been filed with stones so that they could not gnaw their bridles; they looked more like wolves than dogs with their pointed muzzles and their yellow, glowing eyes.

Ernenek iced the sledge runners, then he harnessed the dogs, unfastened the sledge anchor and climbed on to the sledge. Under the whip, the dogs formed out behind the leading dog, pulling on the traces which attached them separately to the sledge and yelping behind the white clouds of vapour coming out of their mouths.

It was hot; the temperature must have been about 17 degrees below zero and Ernenek did not have to run behind the sledge to warm himself; he could remain sitting and enjoy the drive.

The icy Ocean on which he travelled, frozen to a depth which exceeded a man's height and superficially covered with snow, bore the clear trace of the sledge of his friend who had started before him. Ernenek did not turn to look at the solitary igloo he was leaving behind, a minute cute hump of ice at the top of the world.

6. Ernenek's dogs resembled wolves because they had
   A. a very sharp sense of smell.
   B. filed teeth and a small muzzle.
   C. great strength to pull the sledge.
   D. pointed muzzles and glowing eyes.

7. We can tell from the passage that auks are
   A. animals like bears.
   B. related to seals.
   C. dogs that pull sledges.
   D. birds.

8. The dogs' teeth had been filed with stones to make them
   A. sharp.
   B. clean.
   C. smooth.
   D. blunt.

9. Why did Ernenek ice the runners of his sledge?
   A. to cool them off.
   B. to make them slippery.
   C. so he could harness the dogs.
   D. to keep them from over-heating.

Please turn over and continue

10. In describing the dogs, the writer tries to make them seem
    - A. brave.
    - B. strong.
    - C. well-trained.
    - D. savage.

11. In saying that Ernenek's igloo was "at the top of the world", the writer means that it was
    - A. on the icy Ocean.
    - B. near the North Pole.
    - C. far from any other home.
    - D. very small and unimportant.

12. We can tell from the fourth paragraph that
    - A. It was a really hot day.
    - B. Ernenek hated to run.
    - C. Ernenek got cold easily.
    - D. Ernenek was used to very cold weather.

Please continue

Simonides was a poet. He wandered round the wealthy cities of Asia, composing poems and singing the praises of warriors for such reward as he could gain. By this means he gathered a considerable amount of wealth, and after some years he made up his mind to return by sea to his native island of Ceos. While he was on the ship, a dreadful storm arose, and all the passengers began in panic to gather together their precious belongings.

Simonides stood on the deck calmly, making no effort to gather up his own baggage. Some of the other passengers were amazed at this, and one of them asked Simonides why he was not trying to save any of his property. "All my real wealth", said Simonides, "is in my head". The others laughed at the foolish poet, and as the ship foundered they leapt into the sea weighed down with all their possessions. Some of them attempted to carry such heavy burdens that they drowned. Others managed to struggle ashore. But here they were set upon by thieves, who stripped them naked of all that they owned.

Simonides, meanwhile, made his way to the nearest town, without being robbed, since he had nothing for the thieves to take. No sooner was he in the streets than he was recognized by a lover of his poetry, and showered with clothes, gifts and hospitality.

Next day, as he was walking with some of his new friends and admirers, Simonides happened to see some of his fellow travellers, who were begging for food and shelter. As soon as he saw them, Simonides said, "You see, you laughed at me on the ship when I said that my real wealth was in my head. But now you are beggars while I am well clothed and on my way to being prosperous again; now I can help you. What you have tried to save is all lost. But I carried my riches along with me - my poems".

13. Simonides had made his living by composing poems that told of
    A. the beauty of nature.
    B. life on the sea.
    C. life in ancient times.
    D. the great deeds of warriors.

14. The other passengers laughed at Simonides because he
    A. had no baggage.
    B. did not try to save his possessions.
    C. was so frightened of the storm.
    D. read poems during the storm.

15. The thieves did not rob Simonides because he
    A. was recognized by them.
    B. had no possessions.
    C. made poems for them.
    D. was able to escape them.

Please turn over and continue

16. What suggests that Simonides' poems were not written down?
    A. He said his real wealth was in his head.
    B. He did not try to gather his belongings.
    C. They had to do with the deeds of warriors.
    D. No one recognized his poetry.

17. When Simonides said "my real wealth is in my head", he meant
    A. by his knowledge he could earn new wealth.
    B. beauty is more important than mere possessions.
    C. he had very little that he owned.
    D. he was a very intelligent man.

18. The idea that the writer of this story is trying to get over to us is that
    A. possessions are of no value.
    B. life is dangerous and uncertain.
    C. poetry may be wealth.
    D. poetry is beautiful

19. In this story, the author's main purpose is to
    A. entertain his reader.
    B. write very beautifully.
    C. weave a lesson into the story.
    D. give some useful information.

ie

Please continue

Before the advent of hunters with guns, the musk ox was king of the tundra. His heavy coat protected him against the cold of winter and the swarms of bloodsucking insects in summer. With his heavy hooves he could break the ice crusts that covered the willow branches he was so fond of. When danger threatened, the bulls lined up before the cows and their young. With their strong, sharp horns they were more than a match for wolves or hunters with primitive weapons. But when they lowered their heads and charged they made an easy target for a huntsman with a gun. And so now there are only about seven thousand musk oxen.

20. The word "advent" in line 1 most nearly means
    A. sport.
    B. attack.
    C. ending.
    D. arrival.

21. If a European hunter went to hunt the musk ox in summer, the worst trouble he would face would be
    A. wolves.
    B. insects.
    C. the charge of the bulls.
    D. a chance of frost-bite.

22. The last sentence suggests that
    A. the musk oxen are dying off.
    B. the musk ox is a stupid animal.
    C. the musk ox cannot survive in today's world.
    D. hunters are killing too many musk oxen.

23. The musk ox lives in the
    A. far North.
    B. desert.
    C. jungle.
    D. mountains.

24. The writer's feelings about the musk ox can best be described as
    A. fear of such a powerful animal.
    B. eagerness to go and hunt one.
    C. interest in their care for their young.
    D. concern that they may all be killed.

END OF SECTION D

DO NOT TURN OVER UNTIL YOU ARE TOLD
TO DO SO

SECTION P

READING SPEED

PRACTICE TEST

Directions

Here is a story. The story has many little parts. When you come to the end of a part there will be three words like this:

one two three

Put a line under the word that fits in the story. For this test you underline the words in the booklet.

Read as fast as you can, and see how many parts of the story you can read and mark in the time that you have.

Remember - read as fast as you can, but be sure to mark the right word after each part of the story.

1. Yesterday we went to the airport. While we were there a big plane came in. On each side of it there were a great many

eggs windows wings

2. We saw the people get out of the plane. Some of them had bags in their hands. The bags had been in the

airport people plane

3. We went to meet my Aunt Jane. She was coming to spend two weeks with us. We shall see Aunt Jane for two

days weeks months

4. Aunt Jane has three children. The oldest is a boy and the other two are girls. The name of Aunt Jane's oldest child is

Alice Mary Roger

5. Next week Roger will come to visit us too. He will stay and go home with my Aunt Jane. He will go home with his

brother mother sister

6. Roger is two years older than my brother John. John was ten years old last month. Roger's age is now

eight ten twelve

7. While Roger is here we will go to the zoo. We will see the lions and the bears. These are what we like best in the

house store zoo

8. Mother will make a big cake for Roger. He likes chocolate cake very much, and so the cake my mother makes will be

fresh little chocolate

9. Roger will sleep in the same room with my brother John. There are two beds in the room. Each boy will have his own

bed dog room

10. Roger likes to ride in the car. There are many nice drives near the city where I live. We will take Roger for a long

ride walk while

11. Next summer I hope to visit Roger. I will ride to his city on the railroad. I will go to visit Roger in a

car plane train

12. Roger lives near a large lake. We like to swim in the lake when it is warm. We only swim there in the

night summer winter

13. There are many boats on the lake. Some of them have sails, and some of them have motors. All of them are on the

lake land shore

14. The sailboats need some wind in order to go. Boats with a motor need no wind at all. A motorboat is the best kind on a day that is

calm dry windy

15. The white sails of the sailboats are very pretty. The wind on the sails makes them tip. On a windy day the boats on the lake are very

dry empty pretty

16. On my train trip I will pass many farms. There are some cows on these farms. From the train I shall probably see some of these

cows sheep trees

17. Some of the cows are black and white, and some are brown and white. The brown and white cows give the richest milk. Milk from the other cows is not so

clean much rich

18. The train will make four stops on the way to Roger's city. I do not get off at any of them. The stop that I get off at is the

first second fifth

TURN THE PAGE

19. The first stop is at the town of Bellport. Here there is a factory where shoes are made. Shoes are the main product in this

country	town	village

20. After that we come to Pennsville. We stop there for only two minutes, and there is no time to get off. The stop is very

late	long	short

21. The third stop is Johnson City. This is where we change engines. The stop at Johnson City has to be long enough to put on a new

engine	hat	train

22. From Johnson City it is only one hour to the city where my friend lives. One hour after we leave Johnson City, I will get

in	off	wet

23. For the last hour, most of the way is through forest. For that part of the trip we see many trees, but we see very few

branches	houses	leaves

24. There are some animals in the forest. But these animals are afraid of the train. When a train comes through the forest they run

away	by	up

25. Because the animals are afraid, we will probably not see them. They will keep out of sight. We will be sorry not to see the

trees	animals	people

26. At the fifth stop, I will get off the train. Roger will meet me at the station. I will be glad to see him in the

car	morning	station

27. From the station we will drive to Roger's house. We have to drive all the way across town from the south to the north. On the south side of town is the

house lake station

28. Roger lives on the edge of town. It is a short walk from his house to the lake. It is easy to walk from his house to the

lake station store

29. The lake by Roger's house is very wide. It is two miles to the far side. Houses on the far side of the lake look very

large pretty small

30. A road goes all the way around the lake. It makes a very long walk around the lake, but it is not hard to go around in a

car hurry minute

31. Roger has two friends who live in the house next to his. Both of them are boys. How many boys live in the house next to Roger?

one two three

32. Roger likes to play ball with his two friends. They all play on a team at school. There are five boys on the team. Two other boys play on the team with Roger and his

friends sisters uncles

33. On the other side of the lake there are several large farms. The farms grow mostly corn to feed to animals. These animals like to eat

corn fish meat

34. We will go to see the farms. We will work helping the farmer feed his animals. If we work hard, we may get a treat from the

animals farmer help

TURN THE PAGE

35. It will be hot working on the farm. When we are through we will swim in the lake. This will make us feel much

cooler sleepier stronger

36. I will stay at Roger's house for ten days. After that I will come back to my own house. I will stay at Roger's house more than a

month week year

37. When I come back home Roger's father will drive me in his car. It will take about six hours. We will leave in the middle of the morning and get home in the middle of the

afternoon night morning

38. The road from Roger's house to mine is not a good road. It was built many years ago. It has had much wear, and the ride will be

bumpy quick slippery

39. It will be good to be home again. The trip will be great fun, but I will miss my own family. When I get home and see them, I will be

happy sick tired

40. My friends at home will be glad to see me too. When I am home we sometimes fight, but when I come back from a trip they are always

alone mad nice

END OF BOOKLET 3

I. E. A.

IEA/3J

BOOKLET 3 J

READING SPEED TEST

Directions

Here is a story. The story has many little parts. When you come to the end of a part there will be three words like this:

one two three

Put a line under the word that fits in the story. For this test you underline the words in the booklet.

Read as fast as you can, and see how many parts of the story you can read and mark in the time that you have.

Remember - read as fast as you can, but be sure to mark the right word after each part of the story.

1. Peter has a little dog. The dog is black with a white spot on his back and one white leg. The color of Peter's dog is mostly

   black   brown   grey

2. When Peter got the dog it was a small puppy. Now the dog is a little more than two years old. How many years has Peter had the dog?

   one   two   three

3. Peter's dog has a spot on his back. That is why Peter named the dog Spot. The dog was named after the spot on his

   back   ear   leg

4. The dog has learned to do two tricks. One trick is to catch a ball. To stand on its hind legs is the second

   story   trick   way

5. When he was a puppy Spot was fed three times a day. Now he is fed only once. The number of times is now

   often   less   many

6. Spot is most happy when he gets a bone. He would like to have a bone every day, but he does not get one that

   small   hungry   often

7. Spot lives in his own little house. It is a red house and it is made of wood. The house that Spot lives in is

   green   red   white

8. Peter's mother does not like to have Spot in her house when he has dirty feet. When his feet are dirty Spot must stay

   inside   hungry   outside

9. Sometimes Peter has dirty feet too. Then his mother makes him wipe them off on the mat. The mat is used to keep the house

   clean   dry   warm

Reading Speed Test

10. Peter likes to play with Spot. Often they run together. Peter can run quite fast, and yet Spot can run

faster now home

11. One day Peter went for a long walk. Spot came along too. Spot had great fun. When Peter goes for a walk Spot always wants to

eat go sleep

12. While they were walking they saw a bird. The bird was sitting on the ground under a tree. Peter saw the bird sitting on the

branch ground tree

13. Spot saw the bird too. Spot wanted to catch the bird. The bird was something that Spot wanted to

catch find scare

14. Spot ran after the bird. While he ran after the bird he kept barking. Spot was barking while he chased the

ball bird boy

15. When Spot chased the bird it flew away. It flew up into the tree. It flew to the top of the tree and sat on a

branch store box

16. Spot was surprised. He did not know where the bird had gone. He did not know that the bird had flown to the

bush house tree

17. Spot ran around in circles. He ran this way and that way. He kept looking and looking. He was looking for the

bird bone dog

18. The bird in the top of the tree started to sing. He sang because he was happy. Because he was safe in the tree he started to

fly sing sleep

19. A second bird came to the tree too. He came to join the first bird. How many birds were there in the top of the tree now?

none one two

20. The birds flew away from the tree together. They flew to a field of wheat. The birds were hungry and wanted to eat some

berries corn wheat

TURN THE PAGE

21. There were many birds in the field. They were all eating the grains of wheat. They were all eating the wheat in the

box field house

22. Spot and Peter came walking by the field. When Spot saw the birds, he was very excited. He was excited to see so many

birds grains people

23. Spot ran into the field. When he got to the middle of the field, he started to bark. He stood barking in the middle of the

day field night

24. The birds did not wait for Spot. Before he reached the field they flew away. They flew away because they were

afraid alone hungry

25. Spot did not know what to do next. He sat barking in the middle of the field. He sat and waited for Peter to

bark come cry

26. Peter came to the edge of the field and stood still. Then he called to Spot. He called to Spot from the edge of the

field road woods

27. When Peter called, Spot ran over to him. Peter patted Spot on the head. Because Spot obeyed Peter, Peter thought he was a good

boy dog fighter

28. They walked until they came to the main road. There they saw a bus come by loaded down with people. There were a great many people in the

bus house town

29. The bus was going to the next town. In this town there is a large market. Many people ride the bus to go to the

lake market station

30. Peter saw his father on the bus. Peter's father works in the next town. He has to ride the bus when it is time to go to

bed visit work

31. Peter walked along the road with Spot. They met another dog on the road. Spot growled and growled at the other dog. Spot was not

greedy friendly lonely

32. The other dog started to growl too. But then he turned and ran away. He was afraid of Spot. The other dog was not very

hungry brave sad

33. Peter and Spot came to a bridge across a stream. Peter got some small stones from the side of the road. He threw them into the

lake puddle stream

34. Spot saw Peter throw a stone. He started to run after the stone. He did not see the stream. He fell into the

hole mud water

35. Spot started to swim. He swam across the stream and came out the other side. Then he ran back to Peter across the

bridge lake field

36. Spot was all wet. He started to shake himself. He shook himself right beside Peter. When he shook himself, it made Peter

glad hot wet

37. Peter stood in the middle of the bridge and watched the stream. He saw something small swimming in the stream. He thought it was a

boat boy fish

38. Now it was time for Peter to go home. There was some work to do at home. Peter often did work in the garden. He was a very good

cook gardener tailor

39. Peter and Spot hurried home. Peter's mother was waiting by the door. She had some gardening to be done, so she was glad to see

sunshine Peter Spot

40. Peter hurried to get his work done. His mother had promised him some candy when he was finished. He wanted to finish so he could get the

ball candy money

END OF BOOKLET 3 J

IEA/7 C
7 D
7 E
7 P

I. E. A.

BOOKLET 7

Reading Comprehension

Directions

This is a test to see how well you understand what you read. The test is made up of four stories with a number of questions on each. Read the first story and then answer the questions on it. Then go on to the second story and so on until you come to the end of Section C.

Each test item starts with a statement or question and then gives you four endings or answers. Pick the best ending or answer and blacken the space corresponding to the answer you have chosen on your answer card.

You may read the story over again as much as you need to. Try each question in turn. If you don't know the answer, you may leave it and go on to the next. Come back to it later if you have time.

You should answer even if you aren't sure of the right answer. However, do not guess blindly.

When you finish one story go ahead to the next. Keep going until you reach the end of Section C. If there is time left, go back and try to do any that you skipped the first time through.

SECTION C

Ernenek slipped out of his sleeping bag. On top of his clothes made of small auk's skins, with the feathers inside, he put on other clothes made of bear skin, with the fur on the outside, and pushed the trouser legs into his sealskin boots.

He came out of the narrow tunnel of the igloo on all-fours, pulling the half-asleep dog, who was the leader of the team, by its leash, while the other dogs followed yawning and shaking the rime off their thick fur. They clamoured for food by barking and showing their teeth which had been filed with stones so that they could not gnaw their bridles; they looked more like wolves than dogs with their pointed muzzles and their yellow, glowing eyes.

Ernenek iced the sledge runners, then he harnessed the dogs, unfastened the sledge anchor and climbed onto the sledge. Under the whip, the dogs formed out behind the leading dog, pulling on the traces, which attached them separately to the sledge and yelping behind the white clouds of vapour coming out of their mouths.

It was hot; the temperature must have been about 17 degrees below zero and Ernenek did not have to run behind the sledge to warm himself; he could remain sitting and enjoy the drive.

The icy Ocean on which he travelled, frozen to a depth which exceeded a man's height and superficially covered with snow, bore the clear trace of the sledge of his friend who had started before him.

Ernenek did not turn to look at the solitary igloo he was leaving behind, a minute hump of ice at the top of the world.

1. Ernenek's dogs resembled wolves because they had
   A. a very sharp sense of smell.
   B. filed teeth and a small muzzle.
   C. great strength to pull the sledge.
   D. pointed muzzles and glowing eyes.

2. We can tell from the passage that auks are
   A. animals like bears.
   B. related to seals.
   C. dogs that pull sledges.
   D. birds.

3. The dogs' teeth had been filed with stones to make them
   A. sharp.
   B. clean.
   C. shiny.
   D. blunt.

4. Why did Ernenek ice the runners of his sledge?
   A. to keep them from rusting.
   B. to make them slippery.
   C. so he could harness the dogs.
   D. to keep them from over-eating.

5. In describing the dogs, the writer tries to make them seem
   A. strong.
   B. friendly.
   C. well-trained.
   D. savage.

6. In saying that Ernenek's igloo was "at the top of the world", the writer means that it was
   A. on the icy Ocean.
   B. near the North Pole.
   C. far from any other home.
   D. very small and unimportant.

7. We can tell from the fourth paragraph that
   A. it was a really hot day.
   B. Ernenek hated to run.
   C. Ernenek got cold easily.
   D. Ernenek was used to very cold weather.

Please turn over and continue.

Paracutin was born in Mexico in February, 1943. At the end of one week, Paracutin was 500 feet high and it is now over 9.000 feet high. Today Paracutin is asleep.

What is Paracutin? It is the only volcano in the world which has been seen from its birth right up to the present day. On February 20, 1943, a peasant and his wife set out to work in their maize fields from the Mexican village of Paracutin. They were surprised to find the earth warm under their feet. Suddenly they heard noises deep in the earth and a small hollow appeared in their field. In the afternoon there was a sudden loud noise and stones were flung high in the air. The peasants ran from the field and turned to watch. They saw the birth of a volcano.

There were great bursts of stone and lava and a little hill began to form. By evening this hill was 100 feet high and hot ashes were falling on the village. At night the glare of the hot lava lit up the countryside. The trees near the village were killed and the villagers had to leave their houses. When the village was abandoned, its name was given to the volcano. The news quickly spread to Mexico City, far to the east. Many sightseers and scientists flocked to the scene. The volcano grew and grew for ten years and hundreds of square miles of forest were destroyed. Then Paracutin went to sleep. In spite of all the explosions, not one person was killed.

8. Paracutin was once the name of
   A. a peasant.
   B. a village.
   C. an old mountain.
   D. a Mexican.

9. What was destroyed in the eruption?
   A. only the village of Paracutin.
   B. the villagers of Paracutin.
   C. the forests and fields round Paracutin.
   D. two peasants.

10. When the writer says that Paracutin "went to sleep", he means that it
    A. flattened out.
    B. stopped sending out ashes and lava.
    C. will never be a volcano again.
    D. got covered with grass and trees.

11. In this passage the author is trying to
    A. describe an interesting happening.
    B. explain a scientific story.
    C. make us believe something.
    D. build up suspense.

12. Paracutin is now
    - A. erupting.
    - B. temporarily inactive.
    - C. permanently dead.
    - D. flattened.

13. From the story, where does it appear that Paracutin is located?
    - A. In eastern Mexico.
    - B. In western Mexico.
    - C. In northern Mexico.
    - D. In southern Mexico.

14. What can we learn about volcanoes from this passage?
    - A. New volcanoes may appear in unexpected places.
    - B. There have always been volcanoes on the earth.
    - C. Volcanoes are active from time to time.
    - D. Volcanoes are active for only a few months.

Please turn over and continue.

During the present century, scientific study of man's surroundings and experience is commonly accepted as the desirable way to determine the truth or falsity of statements, opinions, or beliefs.

This was not always so. During past centuries there was much reliance on authority. The opinions expressed by persons in positions of authority and the written statements in approved documents were frequently accepted and taught as oracles of truth. Those questioning the accuracy or validity of these opinions were in grave danger. Many persons, later recognized as leading contributors to the progress of mankind, suffered torture, imprisonment, and even death because they dared to question beliefs or opinions which we now see to have been demonstrably false.

The scientific method emphasized the inductive rather than the deductive approach to the solution of problems. The inductive method is characterised by observations, measurement, definition, enumeration, classification, and the formulation of conclusions on the basis of objective evidence. On the other hand, authoritarianism utilized the deductive method, namely, reasoning from the major premise to a conclusion, without necessarily making explicit all the elements involved in the final statement or opinion.

In one sense authority and scientific method may be harmonized. It is conceivable that the major premises of an authority may be based on scientific studies which have produced demonstrable truths. Deductions made with these truths as major premises and with strict adherence to the principles of logic should be valid.

15. Scientific method has been encouraged
    A. for many centuries.
    B. continuously.
    C. recently.
    D. by authoritarians.

16. "Authority" as used in line 5 of the above article, means
    A. expert opinion.
    B scientific analysis.
    C. inductively determined fact.
    D. assumed truths.

17. Deductive reasoning assumes the accuracy of
    A. conclusions.
    B. major premises.
    C. facts.
    D. a logical synthesis.

18. A central idea of the preceding article is that
    A. deductive methods are hard to apply.
    B. science and logic are opposed.
    C. facts and opinions are about the same thing.
    D. scientific and authoritarian methods may complement each other.

19. Which of the four paragraphs is primarily concerned with comparison?
    A. 1st
    B. 2nd
    C. 3rd
    D. 4th

20. Which of the four paragraphs is primarily concerned with synthesis?
    A. 1st
    B. 2nd
    C. 3rd
    D. 4th

Please turn over and continue.

If you were to begin to enumerate the various uses of paper, you would find the list almost without end. Yet, there was a time when this familiar item was a precious rarity, when the sheet of paper you now toss into the wastebasket without thinking would have been purchased at a great price and carefully preserved. Indeed, for long centuries in man's history, paper was unknown. People wrote on specially prepared sheepskins or goatskins called parchment.

About twenty-two hundred years ago, the Chinese people discovered how to manufacture paper from wood pulp. Later the secret reached Europe. But for many years, the whole operation was done by hand. Imagine making paper by hand, sheet by sheet! It was a reasonably simple process, but it is easy to see why paper was used only by the wealthy.

The first machine for making paper was invented by a Frenchman named Louis Robert. It was a crude machine by today's standards. Many European and American inventors have since contributed to the development of the more efficient papermaking machines now in use. In our time, paper is used throughout the world.

21. A long time ago people used parchment to write on because
    A. parchment lasted a long time.
    B. paper was unknown.
    C. paper tore too easily.
    D. parchment could be prepared easily.

22. The process of making paper was first discovered by
    A. an American.
    B. the French.
    C. the Chinese.
    D. Louis Robert.

23. Why was the process of making paper by hand unsatisfactory?
    A. It was too complicated.
    B. The paper was of poor quality.
    C. It was too slow.
    D. It was a secret.

24. We may conclude that, after Robert's invention, paper became
    A. cheaper.
    B. more valuable.
    C. less useful.
    D. rarer.

25. The main point that is being brought out by the first paragraph of this story is that
    A. it is only recently that paper has been widely available.
    B. for some uses parchment is better than paper.
    C. paper has many different uses.
    D. one should not throw paper in the waste basket.

26. The person who wrote this story was trying to
    A. amuse us.
    B. help us to learn about something.
    C. change how we feel about something.
    D. write something very pretty.

END OF SECTION D

DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO

IEA/7 D

SECTION D

Deep silence reigned over the camp; only the guards were awake. Wrapping his warm cloak closely about him, a sentry on the furthest outpost stamped restlessly. His attention was caught by furtive shadows moving between him and the first grey light and he sensed approaching danger. The alarm was still ringing clear from his bugle as the company of the Legion seized their rifles and fell into battle order. There was no confusion, only an almost incredible neatness and speed. The square was formed about the well with the camels haltered in the middle and the guns placed at the corners. A few signal shots were fired and the sentries fell back on the main body of the troop. All night the enemy had been gathering silently behind the encircling dune and now, with lance and sword, they charged from the surrounding crests. Three sides of the square stood firm; the fourth wavered and broke. The enemy poured into the square, stampeding the camels and stabbing the men in the back.

1. The attack took place in a
   A. forest.
   B. desert.
   C. small town.
   D. mountain pass.

2. The attack took place just at
   A. daybreak.
   B. midnight.
   C. nightfall.
   D. the rise of the moon.

3. We can tell that the night was
   A. hot.
   B. cold.
   C. stormy.
   D. moonlit.

4. The camels were mostly
   A. killed.
   B. seized.
   C. ridden away.
   D. driven off.

5. The camping place was located
   A. on a hillside.
   B. on high ground.
   C. in a hollow.
   D. away from the water.

6. After the alarm was sounded, the sentries
   A. came in to the rest of the troop.
   B. ran away in fright.
   C. kept firing at the enemy.
   D. blew their bugles.

In their first experiments the researchers let the camel have no water in eight days. It lost about 22% of its weight, about 100 kilos. When it finally was given water to drink it emptied one bucket after another, got rounder and rounder and soon returned to its normal condition. A camel can lose anything up to 25% of its weight through evaporation without any danger of losing its life. However, a loss of weight of 12% causes a man to die in a desert. The researchers, who were fond of animals, did not dare to find out how long a camel can stay alive without water. The camel that went longest without water drank 135 liters of it in 10 minutes after 17 days without a drink.

A camel can manage with a small amount of water better than a man can. And furthermore, it can regulate its perspiration much better than we can. If we are compelled to stay in a temperature higher than our normal body temperature, we start to perspire in order to prevent the temperature of our organs from becoming dangerously high. A camel's temperature regulation is different. When the sunshine becomes hotter and hotter the body temperature of the camel follows the temperature of the environment. Only when the body temperature has risen to 40 degrees does a camel begin to perspire. When the cold night of the desert arrives a camel's temperature sinks to 34 degrees. This variation of 6 degrees means that it takes quite a long time in the daytime before a camel starts perspiring.

7. The purpose of this passage is chiefly to explain why a camel
   A. can lose so much weight.
   B. can drink so much water.
   C. does not perspire so much.
   D. is so well suited to the desert.

8. In saying that camels "can regulate perspiration much better than we can", the author means that the camel
   A. can turn his perspiration off and on as he wishes.
   B. has more sweat glands than we have.
   C. responds to smaller changes in temperature.
   D. does not start to perspire as soon as we do.

9. The function of perspiration in man is to
   A. prevent a drop in body temperature.
   B. regulate the body temperature.
   C. let fluid from the body.
   D. remove salt from the body.

10. When the temperature of the air rises above $34^{\circ}C$ a camel starts
    A. perspiring heavily.
    B. saving energy.
    C. showing a higher body temperature.
    D. regulating its drinking of water.

Please turn over and continue

11. The relation between the first and second paragraphs of this article is that the second paragraph
    - A. helps explain the results reported in the first.
    - B. gives further detail about the results reported in the first.
    - C. is more specific than the first in the information it provides.
    - D. presents a different point of view from the first.

12. Judging from the passage, how much does a camel weigh?
    - A. 100 kilograms.
    - B. 500 kilograms.
    - C. 2200 kilograms.
    - D. There is no way of telling.

Please continue

All day long we had been motoring towards Fez, and as we drew nearer to it, but at a distance still of some thirty or forty miles, we began to feel the emanation of a great and ancient city, in the same way that you have the identical experience when approaching the environs of Rome or Paris or London or Peking, some essence, indefinable but not to be confounded with any other, asserting itself in the atmosphere. Unlike a European city, Fez has no outer suburbs, and is enclosed by its own walls; but even the brown-faced, brown-legged, shaven-headed peasants, who in their dazzling white clothes worked in the sepia-colored fields - hardly so much fields as wide territories - seemed to carry some unidentifiable echo of tradition, perhaps of Pharaoh's Egypt. It was not until darkness had enveloped them that we arrived before the majestic crenellated walls of the city, and outside the gates the strings of camels, the story-tellers and snake-charmers and lank ebony minstrels, hung with cowrie-shells, from the dark interior of the continent, and the jostling, wondering crowds that surround them by daylight had taken their departure.

13. How were the boundaries of a field in which a peasant was working marked off?
    A. The boundaries were marked by palm trees.
    B. The boundaries were marked by thick hedges.
    C. There was a fence around each field.
    D. There were no clear boundaries.

14. What was it that first informed the travellers that they were approaching Fez?
    A. The city walls.
    B. The sepia-colored fields.
    C. An indefinable feeling.
    D. The tradition of Pharoah's Egypt.

15. When the travellers were confronted by the city walls they appeared to be
    A. intimidated.
    B. impressed.
    C. disinterested.
    D. astounded.

16. The travellers arrived at the city walls when the jostling crowds
    A. were starting to gather.
    B. were at their peak.
    C. were getting ready to leave.
    D. had gone.

17. The author's primary purpose in this passage is to
    A. provide a vivid and interesting description.
    B. inform the reader about important facts.
    C. change the reader's attitudes.
    D. build up a feeling of suspense.

Please turn over and continue

18. In the paragraph that follows this one it is likely that the author will
    A. tell about the construction of the city's walls.
    B. describe their entrance into the city itself.
    C. tell about the early history of the city.
    D. describe the home life of the peasants.

19. The author's style is best described as
    A. simple and direct.
    B. forceful.
    C. dull and prosaic.
    D. flowery and elaborate.

Please continue

Traditional leather men laugh at the claims made for plastic. They say that plastic shoes are hot in summer and cold in winter. It is not so good as leather, and plastic of high quality is not cheap enough to make it profitable for shoemakers to change from leather.

This may be true for men, who buy strong, comfortable and well-made shoes. Women, however, want fashionable shoes, and do not care too much what they are made of as long as they look smart. The high quality of leather needed to made smart and attractive women's shoes is very expensive and these shoes are so well made that they outlast the rapid changes of fashion. Only a few women can afford to buy a new pair of leather shoes each time the fashion changes.

Perhaps there will be two kinds of shoemakers in the future, those making shoes for men and the luxury market for women, whose material will be leather, and those aiming at the popular market for women. Does this mean that men will only be able to buy strong, lasting, leather shoes, and women only able to afford cheap, fashionable, plastic shoes made to last only for a few months?

20. Which of the three paragraphs represents primarily a speculation?
    A. Only the second.
    B. Only the third.
    C. The first and the second.
    D. The second and third.

21. Women seem more likely to use plastic shoes than are men because women
    A. are more interested in style.
    B. don't want shoes that wear well.
    C. can't afford to pay as much for shoes.
    D. are not as hard on their shoes.

22. Which women does the writer think will continue to wear leather shoes? Women who
    A. are interested in fashion.
    B. want new shoes frequently.
    C. are difficult to fit.
    D. are wealthy.

23. The author's purpose in this passage is primarily to have us
    A. know more about modern techniques in shoe-making.
    B. enjoy an interesting story about shoes.
    C. become aware of differences between men and women.
    D. think about future changes in shoes.

Please turn over and continue

24. Which sentence best conveys the main idea of this passage?
    A. First sentence of the first paragraph.
    B. Last sentence of the first paragraph.
    C. Last sentence of second paragraph.
    D. First sentence of third paragraph.

25. What is the writer's attitude about making shoes of plastic?
    A. He favors them for both men and women.
    B. He favors them for women but not for men.
    C. He is against them for both men and women.
    D. He does not express his own attitude.

26. How is the third paragraph related to the first two? It is a
    A. speculation based on facts given in the first two.
    B. summary of points made in the first two.
    C. contradiction of the first two.
    D. explanation of the first two.

END OF SECTION D

DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO

IEA/7 E

SECTION E

National Centers

The Student Reading Comprehension Questionnaire is to be inserted in this booklet at this point.

This is IEA/7 E and is to be found in the Questionnaire Bulletin. It is three sides long, not including the cover sheet.

SECTION P

National Centers

The Reading Speed Practice Test is the same as that given to Population I. Please therefore insert IEA/3 P from Booklet 3 here. It is five pages long, not including the instruction sheet.

At the end of the test please write :

END OF SECTION P

END OF BOOKLET 7

I. E. A.

IEA/7 J

BOOKLET 7 J

National Centers

IEA/7 J is the same as IEA/3 J

IEA/14 C
14 D
14 E

I. E. A.

BOOKLET 14

Reading Comprehension

Directions

This is a test to see how well you understand what you read. The test is made up of four stories with a number of questions on each. Read the first story and then answer the questions on it. Then go on to the second story and so on until you come to the end of Section C.

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SECTION C

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   A. for many centuries.
   B. continuously.
   C. recently.
   D. by authoritarians.

2. "Authority" as used in line 5 of the above article, means
   A. expert opinion.
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3. Deductive reasoning assumes the accuracy of
   A. conclusions.
   B. major premises.
   C. facts.
   D. a logical synthesis.

4. A central idea of the preceding article is that
   A. deductive methods are hard to apply.
   B. science and logic are opposed.
   C. facts and opinions are about the same thing.
   D. scientific and authoritarian methods may complement each other.

5. Which of the four paragraphs is primarily concerned with comparison?
   A. 1st
   B. 2nd
   C. 3rd
   D. 4th

6. Which of the four paragraphs is primarily concerned with synthesis?
   A. 1st
   B. 2nd
   C. 3rd
   D. 4th.

Please turn over and continue.

All plays must leave out certain facts of life and aspects of human nature; there is not room in a play for everything, nor does the nature of the form demand that there should be. We do not, for instance, ask for the element of probability in a farce, or in a light comedy. We do not expect restraint and common-sense in a tragedy; for if they were present there would be no tragedy. In brief, we expect an author to leave bits of human nature out - to present an artificial concoction rather than a true-to-life one. We ask only that he make this artifice seem plausible; that is to say, if he does his work well, we should not notice the elements he has left out - and the more we do notice their absence, the more unimpressed we are by his skill. Of course, we value most highly the dramatists who manage to include the maximum of elements with the minimum of clumsiness; for we reckon, quite correctly, that a play is both more plausible and more interesting if the characters involved in it are full, like Brutus, of mixed elements and must struggle inside themselves to reach conclusions and perform big actions: this is at least partly what we mean when we say that Shakespeare embraces all humanity, or that characters are "whole" persons rather than bitty cut-outs. When things are made too plain-sailing for characters - when they represent only ambition, or only pride, or only greed, and have no opposites to these in them to make decisions hard for them - then we may accept them as absurd or melodramatic characters, or even as a certain sort of stylised particulars, but we cannot respond to them as fully as we can to Macbeth, or Lear, or Tartuffe, or the people in Chekhov. They are doubtful to us because they have no doubt themselves.

7. Plays must
   A. imitate life.
   B. select from life.
   C. exercise restraint.
   D. use common sense.

8. A play designed to produce laughter is expected to portray incidents which are
   A. natural.
   B. improbable.
   C. true-to-life.
   D. elementary.

9. The conviction which a play carries depends on our not being aware of
   A. its plausibility.
   B. the maximum of elements.
   C. the things left out.
   D. the mixture of characters.

10. Characters appear absurd or doubtful to us if they contain no
   A. ambition.
   B. style.
   C. inconsistencies.
   D. stylised peculiarities.

11. The writer of this passage is trying to present
    A. a point of view in literary criticism.
    B. a closely reasoned argument.
    C. a description of a set of facts.
    D. a theory of human nature.

12. Which sentence in the paragraph (after the 1st) first introduces an important new idea?
    A. 3rd
    B 4th
    C. 5th
    D. 6th

13. What support does the author provide for the position that he is taking?
    A. Examples and illustrations.
    B. Common knowledge.
    C. A series of investigations.
    D. Essentially no support.

Please turn over and continue.

The history of the discovery of the Peking man was exciting despite the fact that this time it was not a more or less accidental discovery but the result of systematic excavation. In 1921 some Swedish and American paleontologists were excavating on a hill near Peking. The hill was called the Hill of Chicken Bones because bones of small birds had been found on it. Then a man walked by, watched the strange work going on and said that if the gentlemen were looking for the bones of dragons, he knew a place where they could find much bigger bones.

The man took them to a limestone cave which was about one kilometer away. In the summers of 1921 and 1923 a lot of bones of big mammalia were found there. They were typical of the Quarternary fauna. Along with the bones some sharp-edged pieces of quartz were found which could be thought to be elementary tools. The professor who led the research work could not give up his idea that in the light of these discoveries it would be possible to find primitive men on the continent of Asia. In 1927 excavations were started in the cave of Tsou-kou-tien but the whole summer passed without any discoveries. Finally, three days before winter stopped the field-work one tooth of a man was found.

It was a molar tooth of a lower jaw. After examining it very carefully one of the researchers came to the conclusion that the tooth did not belong to any known type of man, nor to any living race. On the basis on this one tooth the researcher named not only a new species of man but also a new race, the Chinese man.

14. On the basis of what find was the important conclusion described in the passage made?
    A. A molar tooth.
    B. Some tools.
    C. Some bones of birds.
    D. Some pieces of quartz.

15. The conclusion that the research worker reached is based upon the assumption that one can
    A. describe a human culture from the tools it used.
    B. find human remains by digging in the right places.
    C. make faster progress searching systematically that hunting blindly.
    D. accurately reconstruct a complete creature from one small part.

16. The basic pattern of the organization of this passage is
    A. logical.
    B. chronological.
    C. from general to specific.
    D. from specific to general.

17. What led the scientist to believe that he would find evidence of primitive men on the continent of Asia?
    A. A molar tooth from a lower jaw.
    B. Mammalian bones and sharp-edged pieces of quartz.
    C. The statement of the Chinese about dragon bones.
    D. The excavations at the Hill of Chicken Bones.

18. The author of this passage is primarily interested in
    A. telling an entertaining story.
    B. describing a series of events.
    C. influencing the beliefs and feelings of his readers.
    D. proving a scientific theory.

19. The bones that the investigators first found when they started digging in the cave had come from
    A. early forms of animals like horses, bears, or tigers.
    B. dragons.
    C. small birds.
    D. dinosaurs.

Please turn over and continue.

Commodities and services to which no flow of money payments corresponds may be divided into three groups. The first consists of goods and services received in barter, such as farm rents paid in kind. From the point of view of the nation's productivity or welfare the omission of such bartered goods would obviously understate the total performance of the economic system. The second group consists of goods and services received gratis. The difficulty here is not the lack of monetary form but the absence of any productive service rendered by the recipient. In such cases, since no production of new economic goods takes place, it appears advisable to exclude the goods from the national income total. If an individual received charity or a gift this is but a loss on the part of the donor (whose income has been recorded fully elsewhere), and to count the incomes of both donor and recipient involves either double counting or the consideration of the charity or gift recipient as a producer of service to the donor, an obviously far-fetched conception. The problem becomes more complicated when such free flow of goods (or money) is directed not from individuals but from the business system, either directly or through such social agencies as the government or charitable foundations. Such free goods, whether in the form of money or of commodities, must obviously be counted in somewhere in the national total. While their statistical estimate is difficult, their analytical and quantitive importance is appreciable and likely to grow in the future. The third type of commodities and services for which there is no corresponding money payment comprises those produced and consumed within the individual economic unit. Here the main problem lies in the segregation of economic from non-economic activity, since only a rigid line between the two will enable one to include in or exclude from national income such items as commodities produced as a hobby, services or durable goods used in the household or personal services of housewives and other members of the family. But there is no hard and fast rule by which economic activity can be distinguished from social and individual life in general. The importance of economic motives, the regularity of the activity, the relative proportion in which the resulting commodities and services appear on the market - all have to be considered. No doubt appears as to the propriety of including in national income commodities regularly produced and consumed within the household when they form part of a larger total destined for the market. Similarly, the estimate of national income should include net services from houses owned and inhabited; but there is considerable doubt as to the propriety of including net services of other durable goods. Finally, there is a general agreement among students of the problem as to the exclusion of housewives' services and services of other members of the family, because these activities are motivated largely by non-economic considerations and form much more of a part of life in general than of professional economic activity proper.

20. The word "gratis" in line 7 means most nearly
    A. as a gift.
    B. with thanks.
    C. in small amounts.
    D. without asking.

21. The "free flow of goods" refers to
    A. trade not encumbered with tariffs or restrictions.
    B. gifts for which no return is received.
    C. the surplus profits of the business system.
    D. the easy exchange of goods for money.

22. Why would the work of a housewife not be considered part of the national income?
    A. No money is paid for the work.
    B. The motivation underlying the work is not economic.
    C. No tangible product is involved.
    D. The product is totally consumed within the home.

23. Why might a charitable contribution from a business concern be counted in the national income even though one from an individual would not?
    A. The business concern is directly involved in the nation's productive system.
    B. The contribution from the business has not been counted anywhere else.
    C. The contribution from the business concern is a necessary part of the cost of doing business.
    D. A business is more likely to make a contribution to an institution or organization which must count it as income.

24. On what grounds would the fee of a concert violinist be considered part of the national income while the receipts of a violinist playing on the street corner for nickels would not?
    A. The different motivations of the violinists in the two cases.
    B. The different motivations of those who provide the money in the two cases.
    C. The different amounts of money involved in the two cases.
    D. The fact that the street violinist is untrained.

25. The city of P supports 50 families on the relief roles. The author considers these funds essentially
    A. the indirect contribution of individual taxpayers.
    B. funds provided by the business system.
    C. income created by government action.
    D. a complete social loss.

END OF SECTION C

DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO

SECTION D

All day long we had been motoring towards Fez, and as we drew nearer to it, but at a distance still of some thirty or forty miles, we began to feel the emanation of a great and ancient city, in the same way that you have the identical experience when approaching the environs of Rome or Paris or London or Peking, some essence, indefinable but not to be confounded with any other, asserting itself in the atmosphere. Unlike a European city, Fez has no outer suburbs, and is enclosed by its own walls; but even the brown-faced, brown-legged, shaven-headed peasants, who in their dazzling white clothes worked in the sepia-colored fields - hardly so much fields as wide territories - seemed to carry some unidentifiable echo or tradition, perhaps of Pharoah's Egypt. It was not until darkness had enveloped them that we arrived before the majestic crenellated walls of the city, and outside the gates the strings of camels, the story-tellers and snake-charmers and lank ebony minstrels, and the jostling, wondering crowds that surround them by daylight had taken their departure.

1. How were the boundaries of a field in which a peasant was working marked off?
   A. The boundaries were marked by palm trees.
   B. The boundaries were marked by thick hedges.
   C. There was a fence around each field.
   D. There was no clear boundary.

2. What was it that first informed the travellers that they were approaching Fez?
   A. The city walls.
   B. The sepia-colored fields.
   C. An indefinable feeling.
   D. The traditions of Pharaoh's Egypt.

3. When the travellers were confronted by the walls they appeared to be
   A. intimidated.
   B. impressed.
   C. disinterested.
   D. astounded.

4. The travellers arrived at the city walls when the jostling crowds
   A. were starting to gather.
   B. were at their peak.
   C. were getting ready to leave.
   D. had gone.

5. The author's primary purpose in this passage is to
   A. provide a vivid and interesting description.
   B. inform the reader about important facts.
   C. change the reader's attitude.
   D. build up a feeling of suspense.

6. In the paragraph that follows this one it is likely that the author will
   - A. tell about the construction of the city's walls.
   - B. describe their entrance into the city itself.
   - C. tell about the early history of the city.
   - D. describe the home life of the peasants.

7. The author's style is best described as
   - A. simple and direct.
   - B. forceful.
   - C. dull and prosaic.
   - D. flowery and elaborate.

Please turn over and continue.

The meeting and overtaking of vehicles on rails, either moving or stationary, for which tracks have been laid on the road, is done on the right.

All the same, these movements can be carried out on the left if they cannot be done on the right owing to the narrowness of the space to pass in or to the presence of a parked or stationary vehicle or any other fixed obstacle and provided that this does not endanger road users coming from the opposite direction. Overtaking can also be done on the left in one way streets, when this is justified by the demands of the traffic.

When a vehicle on rails has stopped to allow passengers to enter or alight, whether the track is actually laid on the road or not, the driver may only pass the vehicle on the track, either on the left or on the right, at a reduced speed. Except at those places where the traffic is controlled by a policeman or by traffic lights, the driver driving on the side where the passengers are entering or alighting from the stationary vehicle on the rails must allow them either to reach this vehicle or to pass on to the pavement at the side. He must be prepared to stop if necessary for this purpose.

NOTE: Use street-cars or tram, not both. Whichever term or translation is natural for the country.

8. The audience for whom this passage is written is primarily
   A. drivers of motor vehicles.
   B. motormen of street-cars (trams).
   C. passengers getting on and off street-cars.
   D. policemen directing traffic.

9. The primary purpose of this passage is to provide a set of instructions for
   A. safe driving.
   B. passing on the left.
   C. passing vehicles on rails.
   D. protecting the safety of pedestrians.

10. Under which of these circumstances is passing on the left usually permissible?
   I. one-way street.
   II. cars parked too close on right.
   III. at a traffic light.
   IV. streetcar (tram) stationary.

   A. I & II
   B. I & III
   C. I & IV
   D. II & IV

11. When a street-car (tram) has stopped to let passengers off, a driver must always
   A. stop.
   B. slow down.
   C. pass on the right.
   D. keep a distance of at least 10 feet.

12. The instruction that applies whether the street-car tracks are laid on or beside the road has to do with
    A. letting passengers off.
    B. the side on which to pass.
    C. stopping at traffic lights.
    D. endangering traffic coming the other way.

13. The relation of the second paragraph to the statement made in the first paragraph is that it
    A. states more fully the conditions under which the rule holds.
    B. develops the reasons for the rule.
    C. indicates exceptions to the general rule.
    D. applies the rule in one special situation.

14. The material in this passage is organized by the author primarily so that the reader will know
    A. why he is to act in a certain way.
    B. who is responsible in the situation.
    C. what is likely to happen next.
    D. what actions he is to take.

Please turn over and continue.

Effective thinking, while starting with logic, goes further so as to include certain broad mental skills. It includes the understanding of complex and fluid situations, in dealing with which logical methods are inadequate as mental tools. Of course, thinking must never violate the laws of logic, but it may use techniques beyond those of exact mathematical reasoning. In the fields of social study and history, and in the problems of daily life, there are large areas where evidence is incomplete and may never be completed. Sometimes the evidence may be also untrustworthy; but if the situation is practical, a decision must be made. The scientist has been habituated to deal with properties which can be abstracted from their total background and with variables which are few and well defined. Consequently, where the facts are unique and unpredictable, where the variables are numerous and their interactions too complicated for precise calculation, the scientist is apt to throw up his hands in despair and perhaps turn the situation over to the sentimentalists or the mystic. But surely he would be wrong to ignore both this type of problem and this type of thinking; for the methods of logical thinking do not exhaust the resources of reason. In coping with complex and fluid situations we need thinking which is relational and which searches for cross bearings between areas; this is thinking in a context. By its use it is possible to reach an understanding of historical and social materials and of human relations, although not with the same degree of precision as in the case of simpler materials and recurring events. As Aristotle says, "It is the mark of an educated man to expect no more exactness than the subject permits."

15. The author believes complex practical problems can be solved
    - A. by the use of logic alone.
    - B. only if the rules of logic are disregarded.
    - C. only if all the facts are known.
    - D. only by using both logical and non-logical reasoning.

16. The author implies that mathematical reasoning is likely to be employed with advantage
    - A. when the situations to be dealt with are complex and fluid.
    - B. in history, social study, and the problems of everyday life.
    - C. in stable, clear-cut situations, where there are few unknown or varying factors.
    - D. in dealing with practical problems.

17. The author believes scientists should widen their field of work by undertaking problems that are
    - A. less specific and less precise.
    - B. more exact.
    - C. more abstract.
    - D. more complex and fluid.

18. "Relational thinking" is principally of advantage in
    A. providing working solutions to problems for which the calculation of exact answers is impossible.
    B. dealing with problems for which only an approximate answer is desired.
    C. providing exact answers to ill-defined problems.
    D. dealing with problems related in thought.

19. The author's purpose in this passage is primarily to present
    A. a philosophical point of view.
    B. some important information.
    C. a piece of effective literary composition.
    D. a cleverly conceived argument.

20. In speaking of "thinking which is relational", (line 22) the author is contrasting this with
    A. exact mathematical reasoning.
    B. thinking that violates the laws of logic.
    C. intuitive approaches to human problems.
    D. Aristotle's point of view.

21. That one should expect no more exactness than the subject permits is endorsed by
    A. only the author.
    B. only Aristotle.
    C. the author and Aristotle.
    D. the author and traditional scientists.

Please turn over and continue.

The next 100 years were destined to be the most fertile in the history of horology, because the foundations of nearly all the basic inventions appeared during this period. Robert Hooke, one of the great pioneers, is credited with the invention of the anchor escapement about 1666. This consisted of an anchor-shaped piece of steel, the points of which spanned several teeth of a sharp-toothed gear wheel. When this anchor rocked on a properly placed pivot, it allowed one tooth of the gear wheel to escape at each side of its swing, and the act of blocking the opposite tooth gave sufficient impulse to keep the pendulum swinging. This was a great step in advance in accuracy, and the majority of existing clocks were changed from foliot and verge to anchor escapement. Hooke contributed greatly to the mathematics of horology, and also invented the cylinder escapement which has endured to modern times, becoming the standard escapement for low-priced Swiss watches. As early as 1525, one John Leck of Prague had made a clock having a soft metal fusee. It remained, however, for Hooke to investigate scientifically the various properties of springs which included the fusee. He reinvented and described the fusee, which consisted of cutting a spiral on a conical drum attached to the first wheel. On this was wound first a piece of catgut and later a small chain, the other end of which was fastened to the cylindrical periphery of the barrel containing the main spring. The spiral was arranged so that the large diameter of the spiral was opposite the run-down position of the main spring. That meant that when the watch was fully wound the main spring, through its chain, was pulling on the small diameter of the spiral and, as the mechanism ran down and the tension of the main spring decreased, it was continually pulling on a larger radius, thereby tending to maintain a more constant power on the train and thus helping the mechanism to run at a more constant rate.

George Graham perfected Hooke's anchor escapement by broadening the face of the teeth on the anchor from Hooke's sharp points. This slight broadening prevented the escapement from swinging a little too far at each end of its swing, which can be detected in anchor escapement clocks by the tendency of the seconds hand to recoil slightly at each second. Graham's addition of the slight flats prevented this tendency; the deadbeat escapement did not have this overtravel and is the most common in modern use. This slight change was one of the most important steps in perfecting the time-keeping capabilities of the clock mechanism. Graham realised that temperature would change the length of the pendulum and hence have considerable influence on the rate of a clock. It has since been shown that 1 degree F. change in temperature of the steel rod of a seconds pendulum is equivalent to approximately four seconds in 24 hours, a brass rod, about twice as much; and a glass one, about half as much. Knowing roughly these facts, Graham suggested a compound pendulum composed of steel and brass, and so arranged that the different rates of expansion would offset one another. He abandoned this however, in favor of the mercury reservoir which he invented in 1711 and which, up to the invention of invar and some of the newer alloys that have practically zero coefficient of expansion under heat, was the most accurate pendulum known.

22. A grooved cone of metal is a description of
    A. a fusee.
    B. a cylinder escapement.
    C. a foliot.
    D. an improved pendulum.

23. The kind of escapement most common in modern clocks is called the
    A. anchor escapement.
    B. cylindrical escapement.
    C. deadbeat escapement.
    D. compound escapement.

24. Which of the following types of escapements is probably most economical to construct?
    A. Compound.
    B. Deadbeat.
    C. Cylinder.
    D. Single.

25. The fusee is used as an adjunct to a clock's
    A. main spring.
    B. anchor escapement.
    C. chain of gears.
    D. second hand.

26. One could tell whether an old grandfather clock had an anchor escapement or a deadbeat escapement by
    A. observing the movement of the second hand.
    B. checking to see whether it has a compound pendulum.
    C. examining the points of the teeth on the first wheel.
    D. inspecting the mainspring for the presence of a catgut attachment.

27. The most accurate pendulum available in the 18th century was the
    A. foliot and verge.
    B. compound pendulum.
    C. mercury reservoir pendulum.
    D. invar alloy pendulum.

28. In a compound pendulum, the length of the brass rods is about
    A. half that of the steel rods.
    B. the same as that of the steel rods.
    C. one and a half that of the steel rods.
    D. twice that of the steel rods.

29. The gain from using a cone with a spiral cut into it was that this made possible
    A. compensation for the effect of temperature changes.
    B. adjustment for the changing size of the expanding spring.
    C. replacement of a pendulum with a spring.
    D. nearly uniform power as the spring ran down.

END OF SECTION D

DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO

SECTION E IEA/14 E

National Centers

The Student Reading Comprehension Questionnaire is to be inserted in this booklet at this point. This is the same as IEA/7 E and is to be found in the Questionnaire Bulletin. It is three sides long, not including the cover sheet.

At the end of the questionnaire, please print :

END OF BOOKLET 14

I. E. A.

IEA/8 X
8 Y
8 Z

BOOKLET 8

LITERATURE

SECTIONS X, Y, Z

On the next pages there is a short story. Read the story carefully and thoughtfully before going on to the questions about it.

Read the questions carefully and answer them as thoughtfully and honestly as you can. The questions are preceded by instructions which you should follow. All your answers should be made on your answer card. You will not need any other paper on which to write.

If you have any questions, ask your teacher.

Section X - The Use of Force

Section Y - I See You Never

Section Z - The Man by the Fountain

(Note to National Centers : These tests are to be printed in three separate booklets : IEA/8 X, IEA/8 Y, IEA/8 Z.)

THE USE OF FORCE

They were new patients to me, all I had was the name, Olson. Please come down as soon as you can, my daughter is very sick.

When I arrived I was met by the mother, a big startled looking woman, very clean and apologetic who merely said, Is this the doctor? and let me in. In the back, she added. You must excuse us, doctor, we have her in the kitchen where it is warm. It is very damp here sometimes.

The child was fully dressed and sitting on her father's lap near the kitchen table. He tried to get up, but I motioned for him not to bother, took off my overcoat and started to look things over. I could see that they were all very nervous, eyeing me up and down distrustfully. As often, in such cases, they weren't telling me more than they had to, it was up to me to tell them; that's why they were spending three dollars on me.

The child was fairly eating me up with her cold, steady eyes, and no expression to her face whatever. She did not move and seemed, inwardly, quiet, an unusually attractive little thing, and as strong as a heifer in appearance. But her face was flushed, she was breathing rapidly, and I realized that she had a high fever. She had magnificent blonde hair, in profusion. One of those picture children often reproduced in advertising leaflets and the photogravure sections of the Sunday papers.

She's had a fever for three days, began the father and we don't know what it comes from. My wife has given her things, you know, like people do, but it don't do no good. And there's been a lot of sickness around. So we tho't you'd better look her over and tell us what is the matter.

As doctors often do I took a trial shot at it as a point of departure. Has she had a sore throat?

Both parents answered me together, No ... No, she says her throat don't hurt her.

Does your throat hurt you? added the mother to the child. But the little girl's expression didn't change nor did she move her eyes from my face.

Have you looked?

I tried to, said the mother, but I couldn't see.

As it happens we had been having a number of cases of diphtheria in the school to which this child went during that month and we were all, quite apparently, thinking of that, though no one had as yet spoken of the thing.

Well, I said, suppose we take a look at the throat first. I smiled in my best professional manner and asking for the child's first name I said, come on, Mathilda, open your mouth and let's take a look at your throat.

Nothing doing.

Aw, come on, I coaxed, just open your mouth wide and let me take a look. Look, I said opening both hands wide, I haven't anything in my hands. Just open up and let me see.

Such a nice man, put in the mother. Look how kind he is to you. Come on, do what he tells you to. He won't hurt you.

At that I ground my teeth in disgust. If only they wouldn't use the word "hurt" I might be able to get somewhere. But I did not allow myself to be hurried or disturbed but speaking quietly and slowly I approached the child again.

As I moved my chair a little nearer suddenly with one catlike movement both her hands clawed instinctively for my eyes and she almost reached them too. In fact she knocked my glasses flying and they fell, though unbroken, several feet away from me on the kitchen floor.

Both the mother and father almost turned themselves inside out in embarrassment and apology. You bad girl, said the mother, taking her and shaking her by one arm. Look what you've done. The nice man . . .

For heaven's sake, I broke in. Don't call me a nice man to her. I'm here to look at her throat on the chance that she might have diphtheria and possibly die of it. But that's nothing to her. Look here, I said to the child, we're going to look at your throat. You're old enough to understand what I'm saying. Will you open it now by yourself or shall we have to open it for you?

Not a move. Even her expression hadn't changed. Her breaths however were coming faster and faster. Then the battle began. I had to do it. I had to have a throat culture for her own protection. But first I told the parents that it was entirely up to them. I explained the danger but said that I would not insist on a throat examination so long as they would take the responsibility.

If you don't do what the doctor says you'll have to go to the hospital, the mother admonished her severely.

Oh yeah? I had to smile to myself. After all, I had already fallen in love with the savage brat, the parents were contemptible to me. In the ensuing struggle they grew more and more abject, crushed, exhausted while she surely rose to magnificent heights of insane fury of effort bred of her terror of me.

The father tried his best, and he was a big man but the fact that she was his daughter, his shame at her behavior and his dread of hurting her made him release her just at the critical moment several times when I had almost achieved success, till I wanted to kill him. But his dread also that she might have diphtheria made him tell me to go on, go on though he himself was almost fainting, while the mother moved back and forth behind us raising and lowering her hands in an agony of apprehension.

Put her in front of you on your lap, I ordered, and hold both her wrists.

But as soon as he did the child let out a scream. Don't, you're hurting me. Let go of my hands. Let them go I tell you. Then she shrieked terrifyingly, hysterically. Stop it! Stop it! You're killing me!

Do you think she can stand it, doctor! said the mother.

You get out, said the husband to his wife. Do you want her to die of diphtheria?

Come on now, hold her, I said.

Then I grasped the child's head with my left hand and tried to get the wooden tongue depressor between her teeth. She fought, with clenched teeth, desperately! But now I also had grown furious - at a child. I tried to hold myself down but I couldn't. I know how to expose a throat for inspection. And I did my best. When finally I got the wooden spatula behind the last teeth and just the point of it into the mouth cavity, she opened up for an instant but before I could see anything she came down again and gripping the wooden blade between her molars she reduced it to splinters before I could get it out again.

Aren't you ashamed, the mother yelled at her. Aren't you ashamed to act like that in front of the doctor?

Get me a smooth-handled spoon of some sort, I told the mother. We're going through with this. The child's mouth was already bleeding. Her tongue was cut and she was screaming in wild hysterical shrieks. Perhaps I should have desisted and come back in an hour or more. No doubt it would have been better. But I have seen at least two children lying dead in bed of neglect in such cases, and feeling that I must get a diagnosis now or never I went at it again. But the worst of it was that I too had got beyond reason. I could have torn the child apart in my own fury and enjoyed it. It was a pleasure to attack her. My face was burning with it.

The damned little brat must be protected against her own idiocy, one says to one's self at such time. Others must be protected against her. It is a social necessity. And all these things are true. But a blind fury, a feeling of adult shame, bred of a longing for muscular release are the operatives. One goes on to the end.

In a final unreasoning assault I overpowered the child's neck and jaws. I forced the heavy silver spoon back of her teeth and down her throat till she gagged. And there it was - both tonsils covered with membrane. She had fought valiantly to keep me from knowing her secret. She had been hiding that sore throat for three days at least and lying to her parents in order to escape just such an outcome as this.

Now truly she *was* furious. She had been on the defensive before but now she attacked. Tried to get off her father's lap and fly at me while tears of defeat blinded her eyes.

William Carlos Williams - American

Part I

Answer the following questions as carefully and as honestly as you can.

Here is a number of questions that might be asked about "The Use of Force". Some of these are more important than others. Read the list carefully and choose the five (5) questions that you think are the most important, and blacken the appropriate spaces on your answer card.

1. Is there a lesson to be learned from "The Use of Force"?
2. Is "The Use of Force" well written?
3. How does the story build up? How is it organized?
4. What type of story is "The Use of Force"? Is it like any other story I know?
5. How can we explain the way the people behave in the story?
6. Are any of the characters in "The Use of Force" like people I know?
7. Has the writer used words or sentences differently from the way people usually write?
8. What happens in "The Use of Force"?
9. Is "The Use of Force" about important things? Is it a trivial or a serious work?
10. Does the story tell me anything about people or ideas in general?
11. How is the way of telling the story related to what "The Use of Force" is about?
12. Is this a proper subject for a story?
13. Is there anything in "The Use of Force" that has a hidden meaning?
14. When was the story written? What is the historical background of the story and its writer? Does the fact that the author is American tell me anything about the story?
15. What kinds of metaphors (or comparisons), images (or references to things outside the story) or other writer's devices are used in "The Use of Force"?
16. Does the story succeed in getting me involved in the situation?
17. What does "The Use of Force" tell us about people I know?
18. What emotions does "The Use of Force" arouse in me?
19. Is there any one part of "The Use of Force" that explains the the whole story?
20. What is the writer's opinion of, or attitude toward, the people in "The Use of Force"?

Part II

Directions: Each of the questions or incomplete statements below is followed by four suggested answers. One of these answers or completions is the best answer to the problem posed in the question. That is, of the four answers, one makes the most sense in the light of the story you have read. Some of the questions are more important than others. These questions are marked with a star (*). Answer all the questions, but pay particular attention to the starred questions. Read each question carefully, choose your answer and indicate your choice in the appropriate space on your answer card.

* 21. Why had Mathilda been lying to her parents?

A. She was afraid they would scold her for being rude.
B. She wanted her parents to think she was sick.
C. She did not want to go to school.
D. She was afraid she had diphtheria.

22. Which of the following most clearly indicates Mathilda's feelings when the doctor arrives?

A. "cold, steady eyes" (lines 17 to 18)
B. "as strong as a heifer" (line 20)
C. "her face was flushed" (lines 20 to 21)
D. "she had a high fever" (line 22)

* 23. Which of the following best indicated the difference between Mathilda and her parents in their early reaction to the doctor?

A. She is defiant, they are scared.
B. She is angry, they are sad.
C. She is excited, they are calm.
D. She is hopeful, they are despairing.

* 24. Which of the following is the best explanation of why Mathilda clawed for the doctor's eyes (lines 58 to 62)?

A. She wanted to hurt the doctor.
B. She wanted to show her parents how brave she was.
C. She wanted to show the doctor she was healthy.
D. She wanted to keep the doctor from seeing her throat.

25. What caused Mathilda to shriek (line 102)?

A. She was scared by her mother.
B. She was held by her father.
C. She was hurt by the doctor.
D. She had shown the doctor her throat.

Please turn over and continue

26. Which of the following best describes the mother at the beginning of the story (lines 1 - 39)?

A. She is calm and loving.
B. She is careless and neglectful.
C. She is nervous and foolish.
D. She is angry and cruel.

The following questions refer to the mother's attitude towards Mathilda. You are to choose one of the four terms below as the answer to each question. You may use each term once, more than once, or not at all.

A. Coaxing
B. Questioning
C. Scolding
D. Threatening

27. Which term best describes the mother's speech to Mathilda in line 35?

A, B, C, or D

28. Which term best describes the mother's speech to Mathilda in lines 64 to 66?

A, B, C, or D

29. Which term best describes the mother's speech to Mathilda in lines 119 to 120?

A, B, C, or D

* 30. What change in the mother do her five speeches to Mathilda show?

A. That she becomes more emotional.
B. That she becomes less worried about diphtheria.
C. That she becomes more sure of herself.
D. That she becomes less frightened of the doctor.

* 31. What is the doctor's reaction to the mother's speeches to Mathilda that are given in lines 52 to 88?

A. He is angry because she shouts at Mathilda.
B. He is disgusted because she says the wrong things.
C. He is sad because she seems so ignorant.
D. He is fearful because she seems a careless woman.

* 32. What is the doctor's reaction to the mother's last speech (lines 119 to 120)?

A. He is angry that she has interrupted him.
B. He is disgusted at her being ashamed.
C. He tries to change the subject so that Mathilda will not notice that her mother yelled at her.
D. He hardly pays any attention to what she says because he is so intent on what he is doing.

33. What is the doctor's first impression of Mathilda?

A. That she was healthy.
B. That she was very young.
C. That she was beautiful.
D. That she was intelligent.

34. What is meant by "my best professional manner" (line 45)?

A. Skillfully.
B. Curiously.
C. Severely and slowly.
D. Gently and reassuringly.

* 35. When does the doctor first speak threateningly to Mathilda?

A. At lines 46 to 47.
B. At lines 70 to 73.
C. At lines 98 to 99.
D. At line 107.

* 36. Which of the following best describes the doctor's changes in attitude towards Mathilda?

A. He becomes more childlike.
B. He becomes more emotional and violent.
C. He becomes more worried and depressed.
D. He becomes more professional.

* 37. Which of the following is the best summary of what the doctor says in lines 132 to 137?

A. Despite what our laws tell us we should do, we should act according to our beliefs.
B. Despite what society says we should do, the individual must be prepared to assert his own personality.
C. Despite the reasons that others may have for giving up, a person is forced by pride to complete what he begins.
D. Despite any reason we may give for doing something, we really do it for emotional satisfaction.

* 38. There are four inferences to be drawn from lines 83 to 88. Which of these inferences is most important to the development of the story as a whole?

A. These lines show how much the doctor is sorry for the parents.
B. These lines show how uncontrollable Mathilda is.
C. These lines show that the doctor's interest in Mathilda has become personal and not professional.
D. These lines show that the doctor thinks that Mathilda is a beautiful child and not merely a sick one.

Please turn over and continue

* 39. The doctor and Mathilda have several changing relationships in the course of the story. Which of the following is NOT one of the main relationships?

A. Doctor and patient.
B. Parent and child.
C. Two people at war.
D. A winner and a loser.

N. We would like to know how you personally compare this story [illegible] other stories you have read. If you think it is one of the best stories you have read, rate it +3. If you think it is one of the worst you have read, rate it -3.

Here is a scale:

one of the best	good	fairly good	fairly poor	poor	one of the worst
+3	+2	+1	-1	-2	-3

Mark the number of the rating you would give this story on your answer card in space N.

END OF SECTION X

SECTION Y

I SEE YOU NEVER

The soft knock came at the kitchen door, and when Mrs. O'Brian opened it, there on the back porch were her best tenant, Mr. Ramirez, and two police officers, one on each side of him. Mr. Ramirez just stood there, walled in and small.

"Why, Mr. Ramirez!" said Mrs. O'Brian.

Mr. Ramirez was overcome. He did not seem to have words to explain.

He had arrived at Mrs. O'Brian's rooming house more than two years earlier and had lived there ever since. He had come by bus from Mexico City to San Diego and had then gone up to Los Angeles. There he had found the clean little room, with glossy blue linoleum, and pictures and calendars on the flowered walls and Mrs. O'Brian as the strict but kindly landlady. During the war, he had worked at the airplane factory and made parts for the planes that flew off somewhere, and even now, after the war, he still held this job. From the first, he had made big money. He saved some of it, and he got drunk only once a week - a privilege that, to Mrs. O'Brian's way of thinking, every good workingman deserved, unquestioned and unreprimanded.

Inside Mrs. O'Brian's kitchen, pies were baking in the oven. Soon the pies would come out with complexions like Mr. Ramirez's, brown and shiny and crisp, with slits in them for the air almost like the slits of Mr. Ramirez's dark eyes. The kitchen smelled good. The policemen leaned forward, lured by the odor. Mr. Ramirez gazed at his feet, as if they had carried him into all this trouble.

"What happened, Mr. Ramirez?" asked Mrs. O'Brian.

Behind Mrs. O'Brian, as he lifted his eyes, Mr. Ramirez saw the long table, laid with clean white linen and set with a platter, cool, shining glasses, a water pitcher with ice cubes floating inside it, a bowl of fresh potato salad, and one of bananas and oranges, cubed and sugared. At this table sat Mrs. O'Brian's children - her three grown sons, eating and conversing, and her two younger daughters, who were staring at the policemen as they ate.

"I have been here thirty months," said Mr. Ramirez quietly, looking at Mrs. O'Brian's plump hands.

"That's six months too long," said one policeman. "He only had a temporary visa. We've just got around to looking for him."

Soon after Mr. Ramirez had arrived, he bought a radio for his little room; evenings, he turned it up very loud and enjoyed it. And he had bought a wristwatch and enjoyed that, too. And on many nights he had walked silent streets and seen the bright clothes in the windows and bought some of them, and he had seen the jewels and bought some of them for his few lady friends. And he had gone to picture shows five nights a week for a while. Then, also, he had ridden the streetcars - all night some nights - smelling the electricity,his dark eyes moving over the advertisements, feeling the wheels rumble under him, watching the little sleeping houses and big hotels slip by. Besides that, he had gone to large restaurants, where he had eaten many-course dinners, and to the opera and the theatre. And he had bought a car, which later, when he forgot to pay for it, the dealer had driven off angrily from in front of the rooming house.

"So here I am," said Mr. Ramirez now, "to tell you that I must give up my room, Mrs. O'Brian. I come to get my baggage and clothes and go with these men."

"Back to Mexico?"

"Yes, To Lagos. That is a little town north of Mexico City."

"I'm sorry, Mr. Ramirez."

"I'm packed," said Mr. Ramirez hoarsely, blinking his dark eyes rapidly and moving his hands helplessly before him. The policemen did not touch him. There was no necessity for that. "Here is the key, Mrs. O'Brian," Mr. Ramirez said, "I have my bag already."

Mrs. O'Brian, for the first time, noticed a suitcase standing behind him on the porch.

Mr. Ramirez looked in again at the huge kitchen, at the bright silver cutlery and the young people eating and the shining waxed floor. He turned and looked for a long moment at the apartment house next door, rising up three stories, high and beautiful. He looked at the balconies and fire escapes and back-porch stairs, at the lines of laundry snapping in the wind.

"You've been a good tenant," said Mrs. O'Brian.

"Thank you, thank you, Mrs. O'Brian," he said softly. He closed his eyes.

Mrs. O'Brian stood holding the door half open. One of her sons, behind her, said that her dinner was getting cold, but she shook her head at him and turned back to Mr. Ramirez. She remembered a visit she had once made to some Mexican border towns - the hot days, the endless crickets leaping and falling or lying dead and brittle like the small cigars in the shop windows, and the canals taking river water out to the farms, the dirt roads, the scorched fields, the little adobe houses, the bleached clothes, the eroded landscape. She remembered the silent towns, the warm beer, the hot, thick foods each day. She remembered the slow, dragging horses and the parched jack rabbits on the road. She remembered the iron mountains and the dusty valleys and the ocean beaches that spread hundreds of miles with no sound but the waves - no cars, no buildings, nothing.

"I'm sure sorry, Mr. Ramirez," she said.

"I don't want to go back, Mrs. O'Brian,"he said weakly. "I like it here. I want to stay here. I've worked, I've got money. I look all right, don't I? And I don't want to go back!"

"I'm sorry, Mr. Ramirez," she said. "I wish there was something I could do."

"Mrs. O'Brian!" he cried suddenly, tears rolling out from under his eyelids. He reached out his hands and took her hand fervently, shaking it, wringing it, holding to it. "Mrs. O'Brian, I see you never, I see you never!"

The policemen smiled at this, but Mr. Ramirez did not notice it, and they stopped smiling very soon.

"Goodbye, Mrs. O'Brian. You have been good to me. Oh, goodbye, Mrs. O'Brian. I see you never!"

The policemen waited for Mr. Ramirez to turn, pick up his suitcase, and walk away. Then they followed him, tipping their caps to Mrs. O'Brian. She watched them go down the porch steps. Then she shut the door quietly and went slowly back to her chair at the table. She pulled the chair out and sat down. She picked up the shining knife and fork and started once more upon her steak.

"Hurry up, Mom," said one of the sons. "It'll be cold."

Mrs. O'Brian took one bite and chewed on it for a long, slow time, then she stared at the closed door. She laid down her knife and fork.

"What's wrong, Ma?" asked her son.

"I just realized, " said Mrs. O'Brian - she put her hand to her face - "I'll never see Mr. Ramirez again."

Ray Bradbury - American

Part I

Answer the following questions as carefully and as honestly as you can.

Here is a number of questions that might be asked about "I See You Never". Some of these are more important than others. Read the list carefully and choose the five (5) questions that you think are the most important, and blacken the appropriate spaces on your answer card.

1. How is the way of telling "I See You Never" related to what the story is about?
2. Is this a proper subject for a story?
3. Is there anything in "I See You Never" that has a hidden meaning ?
4. When was the story written? What is the historical background of the story and its writer? Does the fact that the author is American tell me anything about the story?
5. What kinds of metaphors (or comparisons), and images (or references to things outside the story) or other writer's devices are used in "I See You Never"?
6. Does the story succeed in getting me involved in the situation?
7. What does "I See You Never" tell me about the people I know?
8. What emotions does "I See You Never" arouse in me?
9. Is there any one part of "I See You Never" that explains the whole story?
10. What is the writer's opinion of or attitude toward the people in "I See You Never"?
11. Does the story tell me anything about people or ideas in general?
12. Is "I See You Never" about important things? Is it a trivial or a serious work?
13. What happens in "I See You Never"?
14. Has the writer used words and sentences differently from the way people usually write?
15. Are any of the characters in "I See You Never" like people I know?
16. How can we explain the way people behave in this story?
17. What type of story is "I See You Never"? Is it like any other story I know?
18. How does the story build up? How is it organized?
19. Is "I See You Never" well written?
20. Is there a lesson to be learned from "I See You Never"?

Please turn over and continue

Part II

Directions: Each of the questions or incomplete statements below is followed by four suggested answers. One of these answers or completions is the best answer to the problem posed in the question. That is, of the four answers, one makes the most sense in the light of the story you have read. Some of the questions are more important than others. These questions are marked with a star (*). Answer all the questions, but pay particular attention to the starred questions. Read each question carefully, choose your answer and indicate your choice in the appropriate space on your answer card.

21. What reason did Mr. Ramirez give for wanting to stay in Los Angeles?

A. He like Los Angeles.
B. He liked Mrs. O'Brian.
C. He worked hard.
D. He had lost his car.

22. Why did Mr. Ramirez say he should be allowed to stay in Los Angeles?

I. He worked hard. II. He had money. III. He looked respectable.

A. I only
B. III only
C. I and II only
D. I, II and III

* 23. Why did Mrs. O'Brian not try to keep the police from sending Mr. Ramirez back to Mexico?

A. She was used to people coming and going.
B. She respected the law.
C. She thought Mexico was lovely.
D. She was afraid of her son's reaction.

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24. Which of the following best describes Mrs. O'Brian's house?

A. Large and comfortable.
B. Clean and shining.
C. Poor but hospitable.
D. Neat and unfriendly.

* 25. Which of the following best explains why Mr. Ramirez walked the streets and rode on the streetcars?

A. He was tired of Mrs. O'Brians little room.
B. He wanted to take his mind off his troubles.
C. He was fascinated by all the new things in Los Angeles.
D. He was making so much money he did not know how to spend it all.

* 26. Which of the following best explains why Mr. Ramirez bought a radio and a wristwatch?

A. These things showed others he was rich.
B. These were things he could not get in Mexico.
C. These were things he could not really afford.
D. These were things that would make Mrs. O'Brian happy.

27. Three of the following contrasts between Mexico and Los Angeles are referred to in the story. Which is NOT referred to?

A. A contrast in food.
B. A contrast in landscape.
C. A contrast in people.
D. A contrast in motion.

* 28. Which of the following is most clearly implied by the word "nothing" (line 80)?

A. No people.
B. No fear.
C. No police.
D. No life.

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29. Which of the following most clearly supports the description of Mrs. O'Brian as strict but kindly?

A. "a privilege that, to Mrs. O'Brian's way of thinking, every good working man deserved, unquestioned and unreprimanded" (lines 15 to 17).
B. "the long table, laid with clean white linen and set with a platter, cool, shining glasses" (lines 25 to 27).
C. "the huge kitchen, the bright silver cutlery and the young people eating and the shining waxed floor" (lines 61 and 62).
D. "She picked up the shining knife and fork and started once more upon her steak" (lines 99 and 100).

30. Why did Mrs. O'Brian say, at this particular moment, "I'm sure sorry, Mr. Ramirez" (line 81)?

A. She did not approve of what the police were doing.
B. She did not want to lose a good tenant.
C. She knew what Mr. Ramirez was going back to.
D. She was in a hurry to get back to her dinner.

31. The policemen smiled (line 91). Why did the policemen stop smiling (line 92)?

A. They realized how serious he was.
B. They decided they did not want him to go.
C. They did not want to seem too friendly.
D. They saw that he was ready to go with them.

Please turn over and continue

* 32. Which of the following best summarizes Mrs. O'Brian's attitude towards Mr. Ramirez in the early part of the story - up to line 81?

A. She had grown to love him and think of him as a part of her family.
B. She liked him as a tenant but did not have any strong feelings about him one way or another.
C. She did not like him because he was a foreigner.
D. She liked him but was afraid he might quarrel with her sons.

* 33. Which of the following comes nearest to what the writer thought of Mr. Ramirez?

A. A foreigner who should try to keep the laws of the country.
B. The unfortunate victim of official restrictions.
C. A well-behaved tenant for Mrs. O'Brian whom she would find hard to replace.
D. A simple-minded man who would in the long run be happier in his own country.

34. Who made the "soft knock" (line 1)?

A. Mr. Ramirez.
B. Mrs. O'Brian.
C. The policeman.
D. Mrs. O'Brian's son.

* 35. Which of the following best summarizes the sort of man Mr. Ramirez is?

A. Nervous and crafty.
B. Ambitious and industrious.
C. Sociable and popular.
D. Shy and gentle.

* 36. What is Mrs. O'Brian's first reaction to Mr. Ramirez's saying "I see you never"?

A. She cries.
B. She says good-bye.
C. She sits down.
D. None of the above.

* 37. In the context of the story as a whole, what is the significance of the last paragraph (lines 105 and 106)?

A. It shows that Mrs. O'Brian found Mr. Ramirez's English hard to understand.
B. It shows that Mrs. O'Brian finally understood what Mr. Ramirez's departure meant.
C. It shows that Mrs. O'Brian hoped Mr. Ramirez would come back to her house again.
D. It shows that Mrs. O'Brian had been so frightened by the police that she could do nothing.

* 38. Which of the following best summarizes the main point of the story?

A. A person's problems understanding the law.
B. A person's love of his country and its people.
C. A person's decision whether to follow the law or her own heart.
D. A person's discovery about the true nature of loss.

N. We would like to know how you personally compare this story to other stories you have read. If you think it is one of the best stories you have read, rate it +3. If you think it is one of the worst you have read, rate it -3.

Here is a scale:

one of the best	good	fairly good	fairly poor	poor	one of the worst
+3	+2	+1	-1	-2	-3

Mark the number of the rating you would give this story on your answer card in space N.

END OF SECTION Y

SECTION Z

THE MAN BY THE FOUNTAIN

As always, John Deweck sat by the fountain.

The spring sun loomed up out of the seething foam. The children honoured the memories of heroic admirals. Their galleons and cutters tacked to and fro across the wide pond. Nursemaids and grandmothers glanced anxiously at frocks and trousers. Over the wide world the fountain sang, thrusting a quivering plume of water at the scudding clouds. Liquid pattered noisily into bowls of marble.

John Deweck sat on his usual bench, speaking to no one. There were a few rules he stubbornly clung to. People spoke so much ill of each other. He no longer listened to their chatter. He had eyes now only for students and soldiers, for young girls and children. Young people fascinated his old carcass. He knew a great deal and had forgotten even more. He craved for youth and approached death's kingdom with reluctant steps.

One by one the frequenters of the fountain left the park. It was time for lunch. John smiled without quite knowing why. Now that he was alone, it seemed to him that he was the head park keeper. It was Thursday. The day on which his wife always used to serve him veal-steak with a delicious sour sauce and potatoes as round as marbles. She had been able to work miracles with a potato. Since her death he had fallen into irregular eating habits. Three slices of bread and jam in the morning. At midday, often not even a bite. Round about five, some lumpy porridge with rusks and some fruit. Usually a sour apple. Sour apples, he believed kept the mental juices clean and preserved the understanding.

He sat now alone with the violence of the fountain.

Perhaps some little boy would turn up? He longed for a serious conversation. Eyes that were still keen swept the avenue that led to the outskirts of the town. Far off in the distance, as in a dream, the little boy came into view. The youngster came tearing up to him, flopped down on the bench and gazed spellbound at the rippling surface of the pond and at the dragons letting the water flow over their green breasts.

"Hello, young man," said John Deweck solemnly.

The child stared at him but said nothing.

"Isn't it your dinner-time?"

"I'm not hungry," said the boy. "I eat once a day. Raw buffalo-meat, as I roam the prairie on my bronco."

"Well, now," said John Deweck, "Well now...who might you be then?"

The boy looked up at him full of pride.

"I am the last of the Mohicans. I lost my friend - the paleface. He was caught in an ambush. But I scented danger. Now I wander alone through the wood and valley ..."

"Where are your feathers?" asked old John sternly.

The child gazed at him with lively interest. Tiny flames flickered in the golden eyes. He flushed with excitement.

"I don't wear feathers in enemy country," he said in a whisper. "But still, I'm on the warpath. I've no war paint on but I've dug up the hatchet. I am the last of my tribe. Are you my friend or foe?"

"What a thing to ask! My name is John. I have always been the foe of the buffaloes and the friend of the Indians. I made a blood-pact with Winnetou. Now I am too old for the hunt. Against whom have you dug up the hatchet?"

"Against the tribe of grown-ups," answered the boy. "They threaten my hunting-grounds and my freedom. They don't understand a thing. How can an Indian live in stuffy school-buildings?"

"Of course he can't," said John. "Though a paleface myself, I'm all for freedom, too. But still, I think school is necessary ..."

The youngster threw him a piercing look.

"Perhaps you're a spy," he said thoughtfully. "The enemy is cunning."

John Deweck gave a high-pitched laugh.

"Nonsense. Take a look around. We're quite alone here. No, I'm not a member of the tribe of grown-ups."

"How strange. So old, yet still a good Indian."

The old man gave a loud sniff. He held his hand out to the young brave.

"Peace," he said, "and many scalps."

"I'll tell you my adventure," said the boy, "provided you can keep a secret."

"Even if I was bound to the torture-post I wouldn't breathe a word."

"This morning I had to hunt for buffalo. As you know, the time has come. Besides, I'm looking for a squaw for my new wigwam. I was creeping out of the kitchen when Dad caught me by the hair. He walloped me for not being ready for school. I didn't make a sound. Only cunning could save me. Meekly I let myself be led to Hook Nose."

"Who is Hook Nose?"

"The school chief," replied the boy. "He's not strong but he's terribly cunning. He laughed like a wild horse and spoke of giving me lines. At ten o'clock, during break, I sneaked out at the gate. I ran as fast as I could....I don't want to go home again. My homeland is the prairie. Tonight I'm looking for a boat and tomorrow I'll be sailing across the seas."

John Deweck looked at the fountain. Impetuously as life itself it leapt up towards the light of the boundless sky. Cherubs spattered with water, blew on their conches as if to warn of impending danger.

A wrinkle creased the aged forehead.

"It's not going to be an easy plan," sighed John Deweck.

"I *must* get a boat," said the boy stubbornly. "You've got to help me."

Heavy clouds drifted towards the spring sun. The birds were silent in the pruned trees.

"First come and eat in my wigwam," faltered John Deweck.

"I'm not hungry."

"You can't refuse bread and salt ..."

The boy thought this over.

"Your mouth speaks the truth," he said. "I must set out on my long journey free from hunger. But I shan't eat meat."

"Bread and salt, O warrior ..."

The boy trotted at the old man's side, looking neither left nor right. He thought of the wild scents of the prairie. He had met an old buffalo-hunter who gave him invaluable tips.

They stepped into the police station. The door closed behind them with a bang.The boy looked about him and understood.

He sat down on a bench and freely volunteered information to a fat man with a ruddy complexion. His head sank on his chest. He did not even glance at John Deweck.

The car arrived shortly afterwards. The father stepped out and thanked the old man. The boy took his place in the car. Suddenly, he turned to the buffalo-hunter.

"You belong to the tribe of grown-ups," he said. "You have betrayed my confidence. I will pay for it at the torture-post. I despise you."

He spat on the ground.

"What did he say?" asked the father.

"That you ought to make him happy," said John Deweck.

Father and son vanished in a cloud of dust.

"The youth of today," grunted the inspector.

Slowly the old man paced through the streets of the little town.

He was never seen again at the fountain.

George Hebbelinck -
Belgian

Part I

Answer the following questions as carefully and as honestly as you can.

Here is a number of questions that might be asked about "The Man by the Fountain". Some of these are more important than others. Read the list carefully and choose the five (5) questions that you think are the most important, and blacken the appropriate spaces on your answer card.

1. What is the writer's opinion of or attitude toward the people in "The Man by the Fountain"?
2. Is there any one part of "The Man by the Fountain" that explains the whole story?
3. What emotions does "The Man by the Fountain" arouse in me?
4. What does "The Man by the Fountain" tell us about people I know?
5. Does "The Man by the Fountain" succeed in getting me involved in the situation?
6. What metaphors (or comparisons), images (or references to things outside the story), or other writer's devices are used in "The Man by the Fountain"?
7. When was "The Man by the Fountain" written? What is the historical background of the story and the writer? Does the fact that the author is Belgian tell me anything about the story?
8. Is there anything in "The Man by the Fountain" that has a hidden meaning?
9. Is this a proper subject for a story?
10. How is the way of telling the story related to what "The Man by the Fountain" is about?
11. Is there a lesson to be learned from "The Man by the Fountain"?
12. Is "The Man by the Fountain" well written?
13. How does the story build up? How is it organized?
14. What type of story is "The Man by the Fountain"? Is it like any other story I know?
15. How can we explain the way people behave in "The Man by the Fountain"?
16. Are any of the characters in "The Man by the Fountain" like people I know?
17. Has the writer used words or sentences differently from the way people usually write?
18. What happens in "The Man by the Fountain"?
19. Is "The Man by the Fountain" about important things? Is it a trivial or serious work?
20. Does the story tell me anything about people or ideas in general?

Please turn over and continue

Part II

Directions: Each of the questions or incomplete statements below is followed by four suggested answers. One of these answers is the best answer to the problem posed in the question. That is, of the four answers, one makes the most sense in the light of the story you have read. Some of the questions are more important than others. These questions are marked with a star (*). Answer all the questions, but pay particular attention to the starred questions. Read each question carefully, choose your answer and indicate your choice in the appropriate space on your answer card.

21. Which of the following statements best describes John Deweck's life before the story opens?

A. He had gone to live with his children after his wife died.
B. He had tried to forget his wife after she died.
C. He had changed his regular habits after his wife died.
D. He became temporarily insane when his wife died.

22. Which of the following is the best explanation of why John Deweck "longed for a serious conversation" (line 23)?

A. He wanted to learn about the history of the Fountain.
B. He wanted to talk to someone who was youthful.
C. He wanted to explain his ideas about children.
D. He wanted to talk to someone who remembered his wife.

* 23. In lines 1 to 22 John Deweck has many feelings about what he sees at the fountain. Which of the following best summarizes his feelings?

A. He feels that he is separated from other people and that he has lost his youth.
B. He feels that his heroic past has been forgotten by others.
C. He feels that the park is unattractive when there are people in it.
D. He feels that he can be understood better by people his own age.

---

* 24. There are three relationships between John Deweck and the boy shown in lines 29 to 62. Which of the following relationships is NOT shown?

A. Adult and youth.
B. Father and son.
C. Co-conspirators.
D. Players in the same game.

25. John Deweck's relationship with the boy steadily progresses from lines 29 to 62. Which of the following phrases interrupts that progression?

A. "young man" (line 29).
B. "Where are your feathers?" (line 39).
C. "I think school is necessary" (line 52).
D. "We're quite alone here." (line 56).

* 26. In lines 29 to 73 the boy's feelings towards John Deweck change. This change can be described in three ways. Indicate the one that is NOT appropriate.

A. From distance to closeness.
B. From dislike to toleration.
C. From interest to involvement.
D. From caution to frankness.

---

27. Which of the following is true of the boy?

A. He is a truant from school who thinks his father is stern.
B. He is the son of a famous soldier.
C. He is looking for his mother who has left his father.
D. He is an Indian who has been taken from his homeland.

* 28. Lines 74 to 77 may be said to be one of the points at which the direction of the story turns. Which of the following best summarizes the turn?

A. The boy decides that he must go back to school.
B. John Deweck decides to make the boy uneasy.
C. The boy realizes that John Deweck is not his friend.
D. John Deweck realizes that he must take the boy to his parents.

---

29. Three of the following are contained in the description of the the fountain in lines 2 to 6. Choose the one that is NOT.

A. It is intermittent.
B. It is pleasurable.
C. It is active.
D. It is widespreading.

30. Which of the following words in lines 22 is unexpected, given the earlier description of John Deweck and the fountain?

A. "sat"
B. "now"
C. "alone"
D. "violence"

Please turn over and continue

31. Which of the following words or phrases in lines 74 to 76 presents a different aspect of the fountain from what was described in lines 2 to 6?

A. "Impetuously as life itself" (line 74)
B. "it leapt up" (line 74)
C. "spattered with water" (line 75)
D. "impending danger" (line 76)

* 32. Which of the following interpretations of the sentences describing the fountain (lines 74 to 77) is most consistent with the story as a whole?

A. The fountain reminds John Deweck of his dead wife.
B. The fountain reminds John Deweck of life abroad.
C. The fountain reminds John Deweck of the way a young person sees life.
D. The fountain reminds John Deweck of the dangers in the boy's sea voyage.

* 33. Which of the following statements about the significance of the fountain is most consistent with the story as a whole?

A. It suggests the happiness that we lose when a loved one dies.
B. It suggests the mystery of life and the pleasure of old age.
C. It suggests the perils that face people who travel.
D. It suggests the liveliness of the world and of youth.

---

34. In the paragraph beginning on line 89, which of the following would be an accurate description of the boy's feelings about John Deweck?

A. Trust and admiration.
B. Nervousness and fear.
C. Loathing and detestation.
D. Tolerance and approval.

* 35. Which of the following words or phrases most clearly reinforce(s) the change that comes after line 77?

I. "Heavy clouds drifted" (line 80)
II. "The birds were silent" (line 80)
III. "looking neither left nor right" (line 89)

A. I only
B. III only
C. I and II only
D. II and III only

* 36. Several things are indicated when we read the two paragraphs about the trip to the police station (lines 89 - 93). Choose the one that is NOT indicated.

A. That the boy understood that he really did want to stay at home.
B. That the boy had come to believe that the old man sympathized with him.
C. That the boy realized that John Deweck was like other grown-ups.
D. That what happened to the boy came as a sudden surprise.

* 37. Which of the following statements best describes the relationship of the two paragraphs (lines 89 - 93) to each other?

A. The first describes events before the story began, the second describes the results of those events.
B. The second explains the boy's actions that are described in the first.
C. The first describes the old man, and the second describes the boy.
D. The second presents a reality that contradicts the dream of the first.

---

38. Three events happen at the end of the story. Choose the one that does NOT actually happen.

A. The boy tells the police who he is and what he had done.
B. John Deweck apologizes to the boy.
C. The boy tells John Deweck what he understands.
D!. John Deweck tries to tell the father what Deweck has learned.

* 39. There are three possible explanations of the last sentence in the context of the story as a whole. Choose the explanation that is NOT possible.

A. John Deweck realized that he would always be lonely.
B. John Deweck felt sorry for what he had done.
C. John Deweck wanted to live with the boy and his family.
D. John Deweck realized that he could not recapture his youth.

Please turn over and continue

N. We would like to know how you personally would compare this story to other stories you have read. If you think it is one of the best stories you have read, rate it +3. If you think it is one of the worst stories you have read, rate it -3.

Here is a scale:

one of the best	good	fairly good	fairly poor	poor	one of the worst
+3	+2	+1	-1	-2	-3

Mark the number of the rating you would give this story on your answer card in space N.

END OF SECTION Z

I. E. A.

IEA/9 W
9 Q
9 R

BOOKLET 9

LITERATURE

On the next pages there is a short story. Read the story carefully and thoughtfully before going on to the questions about it.

Read the questions carefully and answer them as thoughtfully and honestly as you can. The questions are preceded by instructions which you should follow. All your answers should be made on your answer card. You will not need any other paper on which to write.

If you have any questions, ask your teacher.

The Sea

SECTION W

THE SEA

Poor boy. He had very big ears, and when he would turn to the window, they would become scarlet. Poor boy. He was bent over, yellow. The man who cured came by behind his glasses. "The sea", he said "the sea, the sea". Everyone began to pack suitcases and speak of the sea. They were in a great hurry. The boy figured that the sea was like being inside a tremendous seashell full of echoes and chants and voices that would call from afar with a long echo. He thought that the sea was tall and green.

But when he arrived at the sea, he stood still. His skin, how strange it was there. "Mother," he said because he felt ashamed, "I want to see how high the sea will come on me."

He who thought that the sea was tall and green, saw it white like the head of a beer - tickling him, cold on the tips of his toes.

"I am going to see how far the sea will come on me." And he walked, he walked, he walked and the sea, what a strange thing! - grew and became blue, violet. It came up to his knees. Then to his waist, to his chest, to his lips, to his eyes. Then into his ears there came a long echo and the voices that call from afar. And in his eyes all the color. Ah, yes, at last the sea was true. It was one great, immense seashell. The sea truly was tall and green.

But those on the shore didn't understand anything about anything. Above they began to cry and scream and were saying "What a pity, Lord, what a great pity".

Ana Maria Matute -
Spanish

Section I

Answer the following questions as carefully and as honestly as you can.

Here is a number of questions that might be asked about "The Sea". Some of these are more important than others. Read the list carefully and choose the five (5) questions that you think are the most important, and blacken the appropriate spaces on your answer card.

1. Is there any one part of "The Sea" that explains the whole story?
2. What does "The Sea" tell us about people I know?
3. What metaphors (or comparisons), images (or references to things outside the story) or other writer's devices are used in "The Sea"?
4. Is there anything in "The Sea" that has a hidden meaning?
5. How is the way of telling the story related to what "The Sea" is about?
6. Is "The Sea" well written?
7. What type of story is "The Sea"? Is it like any other story I know?
8. Are any of the characters in "The Sea" like people I know?
9. What happens in "The Sea"?
10. Does "The Sea" tell me anything about people or ideas in general?
11. Is "The Sea" about important things? Is it a trivial or a serious work?
12. Has the writer used words or sentences differently from the way people usually write?
13. How can we explain the way people behave in "The Sea"?
14. How does the story build up? How is it organized?
15. Is there a lesson to be learned from "The Sea"?
16. Is this a proper subject for a story?
17. When was "The Sea" written? What is the historical background of the story and the writer? Does the fact that the author is Spanish tell me anything about the story?
18. Does "The Sea" succeed in getting involved in the situation?
19. What emotions does "The Sea" arouse in me?
20. What is the writer's opinion of, or attitude toward the people in "The Sea"?

Please turn over and continue

Section II

Directions: Each of the questions or incomplete statements below is followed by four suggested answers. One of these answers or completions is the best answer to the problem posed in the question. That is, of the four answers, one makes the most sense in the light of the story you have read. Some of the questions are more important than others. These questions are marked with a star (*). Answer all the questions, but pay particular attention to the starred questions. Read each question carefully, choose your answer and indicate your choice in the appropriate space on your answer card.

21. Which of the following do the first two sentences indicate about the boy?

A. That he was unattractive to look at.
B. That he was afraid of the light.
C. That he had no money.
D. That he was very young.

22. What else do the first four sentences indicate about the boy?

A. That he was friendly.
B. That he was sickly.
C. That he was bad.
D. That he was short.

23. Who is the man who cured?

A. A doctor.
B. A priest.
C. The boy's father.
D. A friend.

* 24. Which of the following inferences about the boy is supported by the first paragraph?

A. He had been told that the sea was dangerous but beautiful because of its seashells.
B. He had listened to the seashells and become sick from the habit of doing so.
C. He had gone to the sea and brought back many seashells.
D. He had listened to a seashell and gotten the idea that the sea was beautiful and mysterious.

* 25. Which of the following explains "but when he arrived at the sea, he stood still".

A. The boy was surprised at the sound of the sea and was angry that the seashell was wrong.
B. The boy was surprised at the feel of the sea air and wished he was back at home.
C. The boy was surprised at the sight of the sea and felt as if he did not belong there.
D. The boy was surprised that the sea had a beach, and he did not like to be tickled.

* 26. Which of the following best explains why the boy first said, "I want to see how high the sea will come on me" (lines 11 - 12)?

A. He wanted to cover his body with the sea.
B. He wanted to show how tall he was.
C. He wanted to trick his mother.
D. He wanted to show his mother he was not afraid of the sea.

---

27. As the boy walked into the sea, which of the following changes occurred?

A. A change in color, smell and feel.
B. A change in depth, feel and sound.
C. A change in sound, color and smell.
D. A change in depth, sound and color.

* 28. In the context of the story as a whole, which of the following best explains "Ah, yes, at last the sea was true" (lines 21 - 22)?

A. At last the sea was as he had imagined it would be.
B. At last the sea was as his mother said it would be.
C. At last the sea was as the man who cured said it would be.
D. At last the sea was gone, and he was back at home.

---

29. Which of the following is most likely to have said or thought "Poor boy" (sentence 1)?

A. The boy himself.
B. The person telling the story.
C. The sea.
D. The "man who cured".

* 30. When we read "The man who cured came by behind his glasses", we are being asked to look at the man as if we were which of the following?

A. The man himself.
B. The sea.
C. The boy.
D. The people on the shore.

31. What did "those on the shore" see (line 24)?

A. The boy swimming.
B. The boy drowning.
C. The boy walking on the beach.
D. The boy playing with seashells.

Please turn over and continue

* 32. Who is making the comment, "But those on the shore didn't understand anything about anything"?

A. The boy.
B. The person telling the story.
C. Either of the above.
D. Neither of the above.

* 33. What was it that those on the shore did not understand (line 24)?

A. Why the sea had changed.
B. Why they were on the shore.
C. Why they were screaming.
D. Why the boy did what he did.

* 34. Through whose eyes are we seeing the events of the story?

A. Those of one person - the boy.
B. Those of one person - a person telling the story, but not in the story.
C. Those of two people - the boy and a person telling the story, but not in the story.
D. Those of several people - the boy, his mother, the people on the shore, and the man who cured.

---

35. Which of the following best describes the feelings of the boy in lines 18 to 23?

A. Uncertainty.
B. Anger.
C. Joy.
D. Fear.

* 36. There are many colors in this story: the boy is described as red and yellow, and the sea as green, blue, and violet. Which of the following comments about all the colors is most valid in the context of the story as a whole?

A. The colors help show us that the sea appears to the boy to be opposite to what he is when we first see him.
B. The colors help show us how the sea appears to be two different things for the boy and for his parents.
C. The colors help us see that the person telling the story does not like the sea as much as the boy does.
D. The colors help us see that the boy cannot understand the difference between what happens to him and what happens to the people on the shore.

* 37. Which of the following best expresses the difference between what the boy thought and what the others thought at the end of the story?

A. The boy was ashamed to have lost a dream, and the others pitied his shame.
B. The boy was disappointed by what he saw, and the others were sorry that his vacation was spoiled.
C. The boy was glad to be cured, and the others were surprised at the change that had taken place.
D. The boy was content that his dream was fulfilled, and the others were sorry at his death.

M. We would like to know how you personally would compare this story to other stories you have read. If you think it is one of the best stories you have read, rate it +3. If you think it is one of the worst stories you have read, rate it -3. Here is a scale:

one of the best	good	fairly good	fairly poor	poor	one of the worst
+3	+2	+1	-1	-2	-3

Mark the number of the rating you would give this story on your answer card in space M.

END OF SECTION W

DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO

SECTION Q

IEA/9 Q

National Centers

The Student Literature Questionnaire is to be inserted in this booklet at this point. This is IEA/9 Q and is to be found in the Questionnaire Bulletin. It is four sides long, not including the cover sheet.

SECTION R

LITERATURE

These questions are being put to students in several countries with different cultures. Their purpose is to find out what part books, movies, etc. play in the lives of young people. This material is confidential, and will not be seen by anyone in your school.

Read each question carefully, select the one answer most appropriate for you, and mark it in the appropriate space.

1. Have you done something you would not ordinarily have done because you read about it in a story, poem or play? (For example, when you were younger have you dressed up as a pirate because you read a story about pirates?)

   A. Often.
   B. Occasionally.
   C. Once or twice.
   D. Never.

2. While you were reading a book have you thought of yourself as one of the people in it?

   A. Often.
   B. Occasionally.
   C. Once or twice.
   D. Never.

3. Have you compared a person you meet in real life with people you have read about? (For instance, have you ever called a strong person Samson?)

   A. Often.
   B. Occasionally.
   C. Once or twice.
   D. Never.

4. Have you been in a situation and asked yourself what some person in a story you read would have done in that situation?

   A. Often.
   B. Occasionally.
   C. Once or twice.
   D. Never.

5. When you read a novel or a story, do you imagine that what is happening in the story takes place in some town or city that you have seen?

   A. I have never done it.
   B. I have done it once or twice.
   C. I have done it occasionally.
   D. I have done it often.

6. Have you done something or gone somewhere, felt that this has happened before, and then realised that in fact it happened in a book you read?

   A. Never.
   B. Once or twice.
   C. Occasionally.
   D. Often.

7. When you read a story, how often do you imagine that the people in the story look like people you know?

   A. Often.
   B. Occasionally.
   C. Seldom.
   D. Never.

8. When you meet a new person, how often do you compare the person to someone you saw in a movie?

   A. Often.
   B. Occasionally.
   C. Seldom.
   D. Never.

9. How often do you think that the people you are reading about in a story or play are real people and not simply people in a story?

   A. Never.
   B. Once or twice.
   C. Occasionally.
   D. Often.

10. When you read a story or a play, do you try to remember something that happened to you that is like what you are reading about? Do you say to yourself "Something like this happened to me once"?

    A. Never.
    B. Once or twice.
    C. Occasionally.
    D. Often.

11. How many books have you read for your own pleasure in the past year?

    A. None.
    B. Fewer than 5.
    C. 5 to 10.
    D. More than 10.

12. During the past year, have you read any plays for your own pleasure?

    A. None.
    B. One or two.
    C. 3 to 5.
    D. More than 5.

13. During the past year, have you read any novels for your own pleasure?

    A. None.
    B. One or two.
    C. 3 to 5.
    D. More than 5.

14. During the past year, have you read any biographies for your own pleasure?

    A. None.
    B. One or two.
    C. 3 to 5.
    D. More than 5.

15. When you choose a story or novel to read, which one of the following is most likely to be the reason for your choice?

    A. Friends or parents recommend it.
    B. I have read other books by the same author.
    C. The title attracts me.
    D. I just choose any.

16. How often do you re-read novels , stories or plays?

    A. Never.
    B. Once or twice.
    C. Occasionally.
    D. Frequently.

17. Have you ever gone to a movie because you read the story in a book?

A. Often.
B. Occasionally.
C. Once or twice.
D. Never.

18. Have you ever read a book because you saw the story in a movie?

A. Never.
B. Once or twice.
C. Occasionally.
D. Frequently.

19. Have you ever read a book because you saw the story on television or heard the story on the radio?

A. Often.
B. Occasionally.
C. Once or twice.
D. Never.

20. After you have seen a play or movie, would you want to read a criticism of the work?

A. Often.
B. Occasionally.
C. Once or twice.
D. Never.

Accompanying Notes for IEA/9R

General

The 20 items which make up Section R form two attitude scales, "transfer of affect" and "interest in Literature". These have been developed from the results of pre-testing instrument IEA/ATT/LIT/4, and it is the results of this pre-testing in England, Sweden, Iran and Finland that are quoted below.

"Transfer of affect" scale

The intent of this scale is to measure the amount of transfer that takes place when the student confronts a literary work. We are interested in the extent to which he projects himself into a fictional setting, and the extent to which he interprets reality in terms of his literary experiences. This scale comprises items 1 to 10 of Section R. It is taken, with very minor changes, from the first 10 questions of IEA/ATT/LIT/4. During the pre-testing this scale had a median reliability of .63, and it was interesting to notice that in each of the four countries Population II had slightly higher scores (less transfer of affect) than Population IV.

"Interest in Literature" scale

These items are taken from the second half of IEA/ATT/LIT/4. Items 19 and 20 in this latter instrument have been omitted because of their very low indices of reliability. Also, the first part of question 12 has been dropped as the results from this question (poems) were also erratic. The remaining items have been retained, although there are some minor changes in the wording in one or two places, and the number of alternative responses has been standarised to four. The "interest in Literature" scale in its IEA/ATT/LIT/4 form had a median reliability of .57. In general, it seemed more reliable for Population IV than for Population II, and Population IV ha substantially higher interest scores in each of the four countries for which pre-testing data is available.

Notes for interpretation and translation

"Transfer of affect" scale

Item 1 (median discrimination : .41)
National Centers may find it desirable to substitute a more appropriate example.

Item 2 (median discrimination : .52)
"thought" should be translated by a similarly non-specific word. The question deals directly with the phenomenon of projection.

Item 3 (median discrimination : .51)
Once again, another example may be more appropriate.

Item 4 (median discrimination : .56)

Item 5 (median discrimination : .52)
"story" here implies a piece of fiction.

Item 6 (median discrimination : .51)

Item 7 (median discrimination : .51)

Item 8 (median discrimination : .46)
If movies are rare, then an alternative should be substituted.

Item 9 (median discrimination : .47)
This item gets at the extent of involvement with fictional characters.

Item 10 (median discrimination : .50)

"Interest in Literature" scale

Item 11 (median discrimination : .60)
"pleasure" is intended to exclude books read only to satisfy school assignments.

Item 12 (median discrimination : .32)
See note for question 11.

Item 13 (median discrimination : .37)
See note for question 11.

Item 14 (median discrimination : .43)
See note for question 11.

Item 15 (median discrimination : .56)
A and B are the keyed responses, with B being the more heavily weighted.

Item 16 (median discrimination : .46)

Item 17 (median discrimination : .45)

Item 18 (median discrimination : .50)

Item 19 (median discrimination : .52)

Item 20 (median discrimination : .41)
"criticism" may here be taken to include reviews in newspapers and magazines.

I. E. A.

IEA/18

BOOKLET 18

LITERATURE

OPEN-ENDED

Directions

On the following pages there is a story. After you have read it, please write about it on the blank pages provided.

THE END OF SOMETHING

In the old days Hortons Bay was a lumbering town. No one who lived in it was out of sound of the big saws in the mill by the lake. Then one year there were no more logs to make lumber. The lumber schooners came into the bay and were loaded with the cut of the mill that stood stacked in the yard. All the piles of lumber were carried away. The big mill building had all its machinery that was removable taken out and hoisted on board one of the schooners by the men who had worked in the mill. The schooner moved out of the bay toward the open lake carrying the two great saws, the traveling carriage that hurled the logs against the revolving, circular saws and all the rollers, wheels, belts and iron piled on a hull-deep load of lumber. Its open hold covered with canvas and lashed tight, the sails of the schooner filled and it moved out into the open lake, carrying with it everything that had made the mill a mill and Hortons Bay, a town.

The one-story bunk houses, the eating house, the company store, the mill offices, and the big mill itself stood deserted in the acres of sawdust that covered the swampy meadow by the shore of the bay.

Ten years later there was nothing of the mill left except the broken white lime-stone of its foundations showing through the swampy second growth as Nick and Marjorie rowed along the shore. They were trolling along the edge of the channel-bank where the bottom dropped off suddenly from sandy shallows to twelve feet of dark water. They were trolling on their way to the point to set night lines for rainbow trout.

"There's our old ruin, Nick," Marjorie said.

Nick, rowing, looked at the white stone in the green trees.

"There it is," he said.

"Can you remember when it was a mill?" Marjorie asked.

"I can just remember," Nick said.

"It seems more like a castle," Marjorie said.

Nick said nothing. They rowed on out of sight of the mill, following the shore line. Then Nick cut across the bay.

"They aren't striking," he said.

"No," Marjorie said. She was intent on the rod all the time they trolled, even when she talked. She loved to fish. She loved to fish with Nick.

Close beside the boat a big trout broke the surface of the water. Nick pulled hard on one oar so the boat would turn and the bait spinning far behind would pass where the trout was feeding. As the trout's back came up out of the water the minnows jumped wildly. They sprinkled the surface like a handful of shot thrown into the water. Another trout broke water, feeding on the other side of the boat.

"They're feeding," Marjorie said.

"But they won't strike," Nick said.

He rowed the boat around to troll past both the feeding fish, then headed it for the point. Marjorie did not reel in until the boat touched the shore.

They pulled the boat up the beach and Nick lifted out a pail of live perch. The perch swam in the water in the pail. Nick caught three of them with his hands and cut their heads off and skinned them while Marjorie chased with her hands in the bucket, finally caught a perch, cut its head off and skinned it. Nick looked at her fish.

"You don't want to take the ventral fin out," he said. "It'll be all right for bait but it's better with the ventral fin in."

He hooked each of the skinned perch through the tail. There were two hooks attached to a leader on each rod. Then Marjorie rowed the boat out over the channel-bank, holding the line in her teeth, and looking toward Nick, who stood on the shore holding the rod and letting the line run out from the reel.

"That's about right," he called.

"Should I let it drop?" Marjorie called back, holding the line in her hand.

"Sure. Let it go." Marjorie dropped the line overboard and watched the baits go down through the water.

She came in with the boat and ran the second line out the same way. Each time Nick set a heavy slab of driftwood across the butt of the rod to hold it solid and propped it up at an angle with a small slab. He reeled in the slack line so the line ran taut out to where the bait rested on the sandy floor of the channel and set the click on the reel. When a trout, feeding on the bottom, took the bait it would run with it, taking line out of the reel in a rush and making the reel sing with the click on.

Marjorie rowed up the point a little way so she would not disturb the line. She pulled hard on the oars and the boat went way up the beach. Little waves came in with it. Marjorie stepped out of the boat and Nick pulled the boat high up on the beach.

"What's the matter, Nick?" Marjorie asked.

"I don't know," Nick said, getting wood for a fire.

They made a fire with driftwood. Marjorie went to the boat and brought a blanket. The evening breeze blew the smoke toward the point, so Marjorie spread the blanket out between the fire and the lake.

Marjorie sat on the blanket with her back to the fire and waited for Nick. He came over and sat down beside her on the blanket. In back of them was the close second-growth timber of the point and in front was the bay with the mouth of Hortons Creek. It was not quite dark. The firelight went as far as the water. They could both see the two steel rods at an angle over the dark water. The fire glinted on the reels.

Marjorie unpacked the basket of supper.

"I don't feel like eating," said Nick.

"Come on and eat, Nick."

"All right."

They ate without talking, and watched the two rods and the firelight in the water.

"There's going to be a moon tonight," said Nick. He looked across the bay to the hills that were beginning to sharpen against the sky. Beyond the hills he knew the moon was coming up.

"I know it," Marjorie said happily.

"You know everything," Nick said.

"Oh, Nick, please cut it out! Please, please don't be that way!"

"I can't help it," Nick said. "You do. You know everything. That's the trouble. You know you do."

Marjorie did not say anything.

"I've taught you everything. You know you do. What don't you know, anyway!"

"Oh, shut up," Marjorie said. "There comes the moon."

They sat on the blanket without touching each other and watched the moon rise.

"You don't have to talk silly," Marjorie said; "what's really the matter?"

"I don't know."

"Of course you know."

"No I don't."

"Go on and say it."

Nick looked on at the moon, coming up over the hills.

"It isn't fun any more."

He was afraid to look at Marjorie. He looked at Marjorie. She sat there with her back toward him. He looked at her back. "It isn't fun any more. Not any of it."

She didn't say anything. He went on. "I feel as though everything was gone to hell inside of me. I don't know, Marge. I don't know what to say."

He looked on at her back.

"Isn't love any fun?" Marjorie said.

"No," Nick said. Marjorie stood up. Nick sat there, his head in his hands.

"I'm going to take the boat," Marjorie called to him. "You can walk back around the point."

"All right," Nick said. "I'll push the boat off for you.

"You don't need to," she said. She was afloat in the boat on the water with the moonlight on it. Nick went back and lay down with his face in the blanket by the fire. He could hear Marjorie rowing on the water.

He lay there for a long time. He lay there while he heard Bill come into the clearing, walking around through the woods. He felt Bill coming up to the fire. Bill didn't touch him, either.

"Did she go all right?" Bill said.

"Oh yes." Nick said, lying, his face on the blanket.

"Have a scene?"

"No, there wasn't any scene."

"How do you feel?"

"Oh, go away, Bill! Go away for a while."

Bill selected a sandwich from the lunch basket and walked over to have a look at the rods.

Ernest Hemingway - American.

National Centers

Please insert blank pages at this point for students to write their answer

END OF BOOKLET 18

READING COMPREHENSION

SCORING KEYS

SCORING KEYS

Reading Comprehension

Population I

IEA/3 C
Section C

Question	Correct Response
1	A
2	C
3	C
4	A
5	A
6	B
7	B
8	B
9	D
10	C
11	C
12	A
13	D
14	A
15	C
16	A
17	D
18	D
19	B
20	C
21	B

IEA/3 D
Section D

Question	Correct Response
1	D
2	C
3	A
4	B
5	C
6	D
7	D
8	D
9	B
10	D
11	B
12	D
13	D
14	B
15	B
16	A
17	A
18	C
19	C
20	D
21	B
22	D
23	A
24	D

Population II

IEA/7 C
Section C

Question	Correct Response
1	D
2	D
3	D
4	B
5	D
6	B
7	D
8	B
9	C
10	B
11	A
12	B
13	B
14	A
15	C
16	A
17	B
18	D
19	C
20	D
21	B
22	C
23	C
24	A
25	A
26	B

IEA/7 D
Section D

Question	Correct Response
1	B
2	A
3	B
4	D
5	C
6	A
7	D
8	D
9	B
10	C
11	A
12	B
13	D
14	C
15	B
16	D
17	A
18	B
19	D
20	B
21	A
22	D
23	D
24	D
25	D
26	A

SCORING KEYS

Reading Comprehension

Population IV

IEA/14C
Section C

Question	Correct Response
1	C
2	A
3	B
4	D
5	C
6	D
7	B
8	B
9	C
10	C
11	A
12	C
13	A
14	A
15	D
16	B
17	B
18	B
19	A
20	A
21	B
22	B
23	B
24	B
25	B

IEA/14D
Section D

Question	Correct Response
1	D
2	C
3	B
4	D
5	A
6	B
7	D
8	A
9	C
10	A
11	B
12	A
13	C
14	D
15	D
16	C
17	A
18	A
19	A
20	A
21	C
22	A
23	C
24	C
25	A
26	A
27	C
28	A
29	D

LITERATURE

SCORING AND CLASSIFICATION KEY

SCORING AND CLASSIFICATION KEY

SECTION W

No.	Literature or Reading	Preferred Response	No.	Literature or Reading	Preferred Response
21.	R	A	30.	L	C
22.	R	B	31.	R	B
23.	R	A	32.	L	C
24.	L	D	33.	L	D
25.	L	C	34.	L	C
26.	L	A	35.	R	C
27.	R	D	36.	L	A
28.	L	A	37.	L	D
29.	R	B			

SECTION X

No.	Literature or Reading	Preferred Response	No.	Literature or Reading	Preferred Response
21.	L	D	31.	L	B
22.	R	A	32.	L	D
23.	L	A	33.	R	C
24.	L	D	34.	R	D
25.	R	B	35.	L	B
26.	L	C	36.	L	B
27.	R	B	37.	L	D
28.	R	C	38.	L	C
29.	R	C	39.	L	B
30.	L	A			

SCORING AND CLASSIFICATION KEY

SECTION Y

No.	Literature or Reading	Preferred Response	No.	Literature or Reading	Preferred Response
21.	R	A	30.	R	C
22.	R	D	31.	R	A
23.	L	B	32.	L	B
24.	R	B	33.	L	B
25.	L	C	34.	R	A
26.	L	B	35.	L	D
27.	R	C	36.	L	D
28.	L	D	37.	L	B
29.	R	A	38.	L	D

SECTION Z

No.	Literature or Reading	Preferred Response	No.	Literature or Reading	Preferred Response
21.	R	C	31.	R	D
22.	R	B	32.	L	C
23.	L	A	33.	L	D
24.	L	B	34.	R	A
25.	R	C	35.	L	C
26.	L	B	36.	L	A
27.	R	A	37.	L	D
28.	L	D	38.	R	B
29.	R	A	39.	L	C
30.	R	D			

ERRATUM SHEET - MOTHER TONGUE BULLETIN
(BLUE BULLETIN)

Booklet 3 - Change directions on the cover sheet appropriately to correspond to that which will be read to the students by the test administrator - See Manual 3, Population I, paragraph 22 "This test is made up of four stories..."

Booklet 7 - Change directions on the cover sheet appropriately to correspond to that which will be read to the students by the test administrator - See Manual 3, Population II, paragraph 41 "This test is made up of four stories..."

Booklet 9 - Change Section to read Part I and Section II to read Part II.

Booklet 14 - Change directions on the cover sheet appropriately to correspond to that which will be read to the students by the test administrator - See Manual 3, Population IV, paragraph 72 "This test is made up of four stories..."

INTERNATIONAL ASSOCIATION
FOR THE
EVALUATION OF EDUCATIONAL ACHIEVEMENT
(I.E.A.)

PHASE II STAGE 2

WORD KNOWLEDGE
TESTS ON UNDERSTANDING THE NATURE OF SCIENCE
QUESTIONNAIRES (STUDENT, TEACHER, SCHOOL)
ATTITUDE AND DESCRIPTIVE SCALES

December, 1968

c/o UNESCO INSTITUTE FOR EDUCATION, HAMBURG

This bulletin includes all Word Knowledge tests, Student Questionnaires and Attitude and Descriptive Scales (both general and subject specific), Teacher Questionnaires (both general and subject specific) and the School Questionnaire. Some of the Attitude and Descriptive Scales are not yet completed, and where these are missing, a note has been made that they will be sent as soon as they are ready.

The questionnaires are not arranged into the booklets in which they are to be given to the students. Manual 1 gives the sections which make up these booklets. In some cases sections are those contained in this bulletin. In the Mother Tongue bulletin and Science bulletin where sections from this bulletin have to be inserted, a note has been made.

In ST 2 General (IEA/6G) care must be taken that questions A, G, 01, 02 and P are all printed on one page since this page must be torn off by the student and returned to the National Center.

If you have any queries, please contact the coordinator in Hamburg.

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SECTION F

WORD KNOWLEDGE TESTS

Word Knowledge Test

Directions

In this test words are given to you in pairs. In each pair, the two words have something in common. You must decide whether the words mean nearly the same thing, or nearly the opposite thing, with respect to what they have in common.

If you think the words have the same meaning, draw a ring round the letter "s".

If you think the words have the opposite meaning, draw a ring round the letter "o".

Here is an example:

high low s [✓ o]

The two words "high" and "low" both refer to height. However, they are nearly opposite in meaning. Therefore you should draw a ring round the letter "o", as above.

For each of the following pairs draw a ring round the "s" or the "o". You should attempt every item for which you think you know the answer, but do not guess if you have no idea of the answer.

Word Knowledge Test

1.	quick	slow	s	o
2.	open	shut	s	o
3.	light	heavy	s	o
4.	sorrow	joy	s	o
5.	gain	loss	s	o
6.	punish	reward	s	o
7.	tame	wild	s	o
8.	brave	bold	s	o
9.	baby	adult	s	o
10.	dry	wet	s	o
11.	famous	unknown	s	o
12.	ignorant	wise	s	o
13.	uneasy	comfortable	s	o
14.	narrow	broad	s	o
15.	hinder	help	s	o
16.	grieve	rejoice	s	o
17.	genuine	false	s	o
18.	multiply	divide	s	o
19.	complete	whole	s	o
20.	fight	struggle	s	o
21.	informed	unaware	s	o
22.	prepared	ready	s	o
23.	rich	wealthy	s	o
24.	confident	suspicious	s	o
25.	major	minor	s	o
26.	expel	retain	s	o
27.	share	divide	s	o
28.	rapid	sluggish	s	o
29.	associate	partner	s	o
30.	cleanse	purify	s	o
31.	abandoned	left	s	o
32.	dare	attempt	s	o
33.	hasten	loiter	s	o
34.	precise	exact	s	o
35.	prohibited	forbidden	s	o
36.	boastfulness	modesty	s	o
37.	extent	length	s	o
38.	absolute	relative	s	o
39.	result	effect	s	o
40.	scarce	rare	s	o

CODING AND PUNCHING SCHEME

for

IEA/2F POPULATION I WORD KNOWLEDGE

Variable	Hollerith Card Column No.	Punching code	Details of code
Country Number	3 - 4	01 - 20	As previously distributed.
School Number	5 - 7	001 - 999	School Number coded by National Center.
Target Population	8	1	Punch 1.
Student Number.	9 - 11	001 - 999	Student Number coded by National Center.
Type of Card	12	K	Word Knowledge Card.
Population I Word Knowledge Test. Questions 1 - 40.	13 - 52	1 2 blank	Same (s) Opposite (o) Omitted.

Word Knowledge Test

Directions

In this test words are given to you in pairs. In each pair, the two words have something in common. You must decide whether the words mean nearly the same thing, or nearly the opposite thing, with respect to what they have in common.

If you think the words have the same meaning, blacken in the oval marked "s" on your answer card.

If you think the words have the opposite meaning, blacken in the oval marked "o" on your answer card.

Here is an example:

high	low	s	o

The two words "high" and "low" both refer to height. However, they are nearly opposite in meaning. Therefore you should blacken in the oval marked "o" on your answer card.

For each of the following pairs blacken in either "s" or the "o". You should attempt every item for which you think you know the answer, but do not guess if you have no idea of the answer.

Word Knowledge Test

1.	grieve	rejoice	s	o
2.	informed	unaware	s	o
3.	expel	retain	s	o
4.	rapid	sluggish	s	o
5.	cleanse	purify	s	o
6.	associate	partner	s	o
7.	decoration	ornamentation	s	o
8.	hasten	loiter	s	o
9.	dare	attempt	s	o
10.	ordered	confused	s	o
11.	prohibited	forbidden	s	o
12.	boastfulness	modesty	s	o
13.	wealthy	impoverished	s	o
14.	subtract	deduct	s	o
15.	create	originate	s	o
16.	amiable	charming	s	o
17.	harmony	discord	s	o
18.	rare	habitual	s	o
19.	benevolent	intolerant	s	o
20.	vague	precise	s	o
21.	wise	judicious	s	o
22.	acquire	dispel	s	o
23.	ancient	antique	s	o
24.	puny	robust	s	o
25.	loosen	relax	s	o
26.	despise	scorn	s	o
27.	level	plane	s	o
28.	gauge	measure	s	o
29.	paltry	exorbitant	s	o
30.	absolute	relative	s	o
31.	everlasting	permanent	s	o
32.	conformity	dissimilarity	s	o
33.	converge	approach	s	o
34.	consecrate	dedicate	s	o
35.	deny	repeal	s	o
36.	variable	inconstant	s	o
37.	bounty	generosity	s	o
38.	delicate	tactful	s	o
39.	repudiate	disavow	s	o
40.	obvious	indisputable	s	o

Word Knowledge Test

Directions

In this test words are given to you in pairs. In each pair, the two words have something in common. You must decide whether the words mean nearly the same thing, or nearly the opposite thing, with respect to what they have in common.

If you think the words have the same meaning, blacken in the oval marked "s" on your answer card.

If you think the words have the opposite meaning, blacken in the oval marked "o" on your answer card.

Here is an example:

high	low	s	o

The two words "high" and "low" both refer to height. However, they are nearly opposite in meaning. Therefore you should blacken out the oval marked "o" on your answer card.

For each of the following pairs blacken in either the "s" or the "o". You should attempt every item for which you think you know the answer, but do not guess if you have no idea of the answer.

Word Knowledge Test

IEA/13 F

1.	acquire	dispel	s	o
2.	adorned	embellished	s	o
3.	installed	deposed	s	o
4.	level	plane	s	o
5.	absolute	relative	s	o
6.	paltry	exorbitant	s	o
7.	savoury	insipid	s	o
8.	precarious	stable	s	o
9.	impervious	accessible	s	o
10.	consecrate	dedicate	s	o
11.	converge	approach	s	o
12.	supple	malleable	s	o
13.	hilarious	melancholic	s	o
14.	deny	repeal	s	o
15.	variable	inconstant	s	o
16.	mute	voluble	s	o
17.	miser	prodigal	s	o
18.	repudiate	disavow	s	o
19.	boldness	effrontery	s	o
20.	bounty	generosity	s	o
21.	dishonourable	infamous	s	o
22.	delicate	tactful	s	o
23.	erasure	effacement	s	o
24.	compliant	contentious	s	o
25.	prosperity	opulence	s	o
26.	adjacent	contiguous	s	o
27.	unreserved	unconditional	s	o
28.	garrulous	taciturn	s	o
29.	immutable	fluctuating	s	o
30.	obvious	indisputable	s	o
31.	expatiate	harangue	s	o
32.	hostile	bellicose	s	o
33.	abstruse	explicit	s	o
34.	fetishism	idolatry	s	o
35.	abolish	abrogate	s	o
36.	flagrant	obvious	s	o
37.	diaphonous	translucent	s	o
38.	misanthropic	sociable	s	o
39.	abnegation	egoism	s	o
40.	ephemeral	eternal	s	o

IEA/5T
IEA/12T

SECTION T

TOUS - UNDERSTANDING THE NATURE OF SCIENCE

UNDERSTANDING THE NATURE OF SCIENCE

1. Modern scientists can solve more complicated problems than the scientists of the past because they

   A. know that many of the ideas of earlier scientists were wrong.
   B. have more imagination than earlier scientists.
   C. can build on the ideas and discoveries of earlier scientists.
   D. are more intelligent than earlier scientists.
   E. receive a better education than earlier scientists.

2. Betty is planning an experiment on the conditions required for seeds to germinate. She knows that they need water and air and thinks that warmth and light may also be necessary. She plans to set up one experiment in which seeds of various kinds are given water and air in a warm light place.
   What other experiments should she set up?

   A. One other in which the seeds are without water and air and are kept in a cold, dark place.
   B. One other in which the seeds are without water and air and are kept in a cold, light place.
   C. One other in which the seeds have water and air and are kept in a cold, dark place.
   D. Two others; one in which the seeds have water and air and are kept in a cold, light place, and one in which the seeds have water and air and are kept in a warm, dark place.
   E. Two others, one in which the seeds have water and air and are kept in a cold, dark place and one in which the seeds are without water and air and are kept in a warm, light place.

3. All the following play some part in scientific discovery, but one of them is more characteristic of scientific investigation than the others. Which one is it?

   A. Measurement and calculation.
   B. Using complicated apparatus.
   C. Making experimental measurements more accurate.
   D. Checking through the work of earlier scientists.
   E. Testing ideas by observation and experiment.

4. Scientific discoveries have come from
   A. many countries of the world.
   B. only countries with big industries.
   C. only countries with large populations.
   D. almost all the countries with free education for all.
   E. only countries where the governments finance research.

5. In the past, important scientific discoveries were made by clergymen, statesmen, businessmen, and others who worked on science as amateurs. Why is this less true today?

A. Men in other professions are less interested in science today than they used to be.
B. Scientific research today requires many years of specialised preparation and training.
C. Important discoveries cannot be made today without expensive equipment, which only scientists possess.
D. Only professional scientists have the abilities needed to make important discoveries.
E. Everyone now has to work so hard at his own job that there is not time to work on science as an amateur.

6. We do experiments when we are learning science because

A. experiments are used to test ideas by experience.
B. experiments enable us to learn better.
C. experiments make learning more interesting.
D. we can show that we all get the same results.
E. it is important to learn to handle apparatus skilfully.

7. Why should one make a written note of all the observations made when carrying out a scientific investigation?

A. One might forget them, and they may turn out to be important later.
B. It is a good way to train powers of observation.
C. It trains one to think clearly and write accurately.
D. Good scientists always do it.
E. One is supposed to have a complete record of what one has done.

8. Which of the following is the most complete statement of what scientists study?

A. Atoms, radiations, life.
B. Substances, energy, living things.
C. Matter, space, waves.
D. Plants, animals, micro-organisms.
E. Molecules, earth, stars.

9. Which one of the following is the best description of a scientific experiment?

A. Measurements made to find the value of a physical constant to a greater degree of accuracy.
B. Observations made to learn more about natural phenomena.
C. Observations made under controlled conditions to test a given hypothesis.
D. Studies made with scientific equipment to verify natural laws.
E. Measurements made under specified conditions to support crude, unaided observations.

10. A scientist predicted that an experiment would come out in a certain way. When he did the experiment, the result was different from what he expected. As a scientist, which of the following would be his most likely reaction?

    A. "I should not have made a prediction before trying out the experiment."
    B. "I will improve the experiment and made it come out in the way I predicted."
    C. "If I had better equipment for the experiment, I would get the right results."
    D. "If I practise long enough, it will come out in the way I want it to."
    E. "Something was wrong either with my prediction, the experiment, or my observations."

11. When new evidence that does not fit into a well-established scientific theory appears, which one of the following do scientists usually do?

    A. Discard the theory and produce a new one.
    B. Modify the evidence in such a way that it does fit the theory.
    C. Keep the theory because it has proved useful and ignore the new evidence.
    D. Change the theory in such a wav that the evidence can fit it.
    E. Design experiments to refute the new evidence.

12. The test of the validity of a scientific theory is that the theory

    A. makes it easy to understand the world we live in.
    B. stimulates further scientific investigation.
    C. gives a simple picture of a complicated pattern of natural events.
    D. makes a clear distinction between what are facts and what are beliefs.
    E. explains all the known facts related to certain phenomena.

13. An astronomer in Australia reports that he has seen evidence of plant growth on the planet Venus. Scientists will accept this report as important evidence if

    A. other independent observations confirm the report.
    B. the species of plants have been identified.
    C. the Australian government certifies the observation as correct.
    D. other astronomers agree that there is oxygen on Venus.
    E. the astronomer in Australia is a biologist as well as an astronomer.

14. Which of the following is the principal aim of scientific investigation?

    A. To verify what has already been discovered about the physical universe.
    B. To describe and explain natural phenomena in terms of principles and theories.
    C. To discover, collect and classify as many facts as possible about inanimate and animate nature.
    D. To provide the people of the world with the means for leading happier lives.
    E. To make the world more technologically advanced and so do without hard physical labour.

15. John Smith is a very imaginative young person. If he does not become a scientist, what is the most likely explanation?

    A. He might not want to give up his freedom of thought.
    B. Imaginative people usually become artists or writers.
    C. He might like some other field of work better than science.
    D. Science is too factual and gives no scope for the imagination.
    E. A scientist has to be objective which is impossible if one is imaginative.

UNDERSTANDING THE NATURE OF SCIENCE

1. Which of the following is the most complete statement of what scientists study?

   A. Atoms, radiations, life.
   B. Substances, energy, living things.
   C. Matter, space, waves.
   D. Plants, animals, micro-organisms.
   E. Molecules, earth, stars.

2. Which of the following is the best description of a scientific law?

   A. A good guess about how things happen in nature.
   B. A rule that a scientist follows when he is working.
   C. A statement that summarises similar events in nature.
   D. A concise summary of the results of an experiment in mathematical terms.
   E. A description of natural events by the use of theoretical ideas.

3. Gay-Lussac carried out many experiments with gases and observed that when gases are heated, their volumes always increase in the same way providing that the pressure remains the same. Gay-Lussac expressed this by saying, "at constant pressure, the volume of a given mass of gas varies directly with the temperature." His statement is an example of

   A. the formulation of a scientific theory.
   B. the testing of a scientific hypothesis.
   C. the statement of a scientific law.
   D. a deduction from kinetic theory.
   E. stating the result of a scientific experiment.

4. Which on of the following is the best description of a scientific experiment?

   A. Measurements made to find the value of a physical constant to a greater degree of accuracy.
   B. Observations made to learn more about natural phenomena.
   C. Observations made under controlled conditions to test a given hypothesis.
   D. Studies made with scientific equipment to verify natural laws.
   E. Measurements made under specified conditions to support crude, unaided observations.

5. If a botanist wants to determine the factors that contribute to the growth of a certain plant, which of the following things would be least likely to help him?

   A. Formulate an hypothesis based on what he thinks the factors are.
   B. Find the mathematical equation that fits the plant's growth curve.
   C. Think about the factors that contribute to the growth of other plants.
   D. Look the subject up in the library.
   E. Talk his problem over with other botanists.

6. A scientist predicted that an experiment would come out in a certain way. When he did the experiment, the result was different from what he expected. As a scientist, which of the following would be his most likely reaction?

   A. "I should not have made a prediction before trying out the experiment."
   B. "I will improve the experiment and make it come out in the way I predicted."
   C. "If I had better equipment for the experiment, I would get the right results.
   D. "If I practise long enough, it will come out in the way I want it to."
   E. "Something was wrong either with my prediction, the experiment, or my observations."

7. When new evidence that does not fit into a well-established scientific theory appears, which one of the following do scientists usually do?

   A. Discard the theory and produce a new one.
   B. Modify the evidence in such a way that it does fit the theory.
   C. Keep the theory because it has proved useful and ignore the new evidence.
   D. Change the theory in such a way that the evidence can fit it.
   E. Design experiments to refute the new evidence.

8. Which one of the following best describes the purpose of a scientific theory?

   A. It provides the final answer to a scientific question.
   B. It gives directions for making use of scientific discoveries.
   C. It relates facts and explains different natural events.
   D. It suggests good methods for carrying out scientific experiments.
   E. It implies the questions that lead to further important experiments.

9. In the 17th century, Newton formulated his laws of motion and the theory of universal gravitation, which were eventually accepted by all physicists. In the 20th century, Einstein proposed the much broader theory of relativity, which physicists have now generally accepted. Physicists today consider Newton's ideas as

   A. mistaken because of Newton's limited experience.
   B. concepts that can be contained within Einstein' theory.
   C. applicable only to physical events in the solar system.
   D. superior to Einstein's because they can be used to solve many physical problems.
   E. historically interesting but no longer of much value.

10. An astronomer in Australia reports that he has seen evidence of plant growth on the planet Venus. Scientists will accept this report as important evidence if

A. other independent observations confirm the report.
B. the species of plants have been identified.
C. the Australian government certifies the observation as correct.
D. other astronomers agree that there is oxygen on Venus.
E. the astronomer in Australia is a biologist as well as an astronomer.

11. Which of the following is the principal aim of scientific investigation?

A. To verify what has already been discovered about the physical universe.
B. To describe and explain natural phenomena in terms of principles and the theories.
C. To discover, collect and classify as many facts as possible about inanimate and animate nature.
D. To provide the people of the world with the means for leading happier lives.
E. To make the world more technologically advanced and so do without hard physical labour.

12. If we ask an astronomer to explain why some stars vary in their apparent brightness, he will most likely give his explanation in terms of

A. the logical necessity for some stars at least to vary in brightness.
B. accepted scientific laws and principles.
C. precise mathematical formulae and equations.
D. verify astronomical data.
E. the theory of the expanding universe.

13. John Smith is a very imaginative young person. If he does not become a scientist, what is the most likely explanation?

A. He might not want to give up his freedom of thought.
B. Imaginative people usually become artists or writers.
C. He might like some other field of work better than science.
D. Science is too factual and gives no scope from the imagination.
E. A scientist has to be objective which is impossible if one is imaginative.

14. Today, physicists of several countries are working on experiments to determine whether or not one of Einstein's theories correctly predicts the effect of gravity on light. This work best illustrates the fact that

    A. an important function of a theory is to stimulate research.
    B. it is important to have an accurate value for the velocity of light.
    C. space travel has uncovered new facts that need explanation.
    D. it takes a long time before a theory is found to be generally acceptable.
    E. some people will always doubt the value of any theory.

15. The word model has a special meaning in science and models play an important part in scientific thinking. An example of a scientific model is "the atom is like a miniature solar system composed of electrons in orbits round a nucleus containing protons and neutrons". Which of the following statements about scientific models is NOT correct?

    A. Models are mental images and may not represent reality.
    B. Models contain as few assumptions as possible.
    C. Models represent what scientists could see with very powerful instruments.
    D. Models are only tentative and may be modified or discarded.
    E. Models are useful because they express the unknown in terms of the known.

IEA/1K
IEA/2H
IEA/5K
IEA/6H
IEA/12K
IEA/13H

SECTIONS H AND K

ATTITUDE AND DESCRIPTIVE SCALES

Accompanying Notes for IEA/1K, IEA/5K and IEA/12K

General

The scales proposed for use in the Dry Run are the result of pre-testing work carried out in nine countries. Item analyses of these data were carried out in London, and typical values are quoted in the notes accompanying the items below. There are three attitude scales altogether, and two descriptive scales. Some of these, however, are not appropriate for Population I. For the 10-year-old students, one attitude and one descriptive scale is proposed. The mean scores quoted below are calculated on the basis : response A. has weight 1, response B. has weight 2, etc.

Interest in Science

This scale in included for use with both populations. Its reliability with Population I was about 0.7, and with Populations II and IV about 0.8. It measures interest in Science through (a) asking about the study of Science in school, and (b) asking about participation in scientific or related activities. Some of these activities may be inappropriate for particular National Centers, and in these cases National Centers should substitute equivalent activities (and inform the Coordinator of the change).

Science and the self

Populations II and IV only. Reliability estimate of 0.71. This is a short (6-item) scale. It was pre-tested for Population I in seven of the countries, but it did not seem appropriate because of the substantially lower reliabilities achieved.

Science in the world

A 6-item scale with a reliability of 0.68, intended for use with Populations II and IV. This scale is concerned with the evaluation of Science as a force in the world for good or evil, and is not directly concerned with Science teaching in school.

Description of Science teaching (text book - experimental)

The object of this scale is to determine to what extent the teaching of Science in school is performed by text book or lecture and to what extent it is by demonstrations, laboratory work, field work, etc. It is important that questions are not phrased in a way which will arouse the anger of teachers, and it may be necessary in some countries to reword some items. The information to be gathered, however, should not be altered if possible. The mean F value (between-school/within-school variance) during the pre-testing was about 8.0.

Description of Science teaching (laboratory work : structured or unstructured)

The intent of this scale is to discover the amount of structure that exists in laboratory work in the schools. At one end of the continuum would be a laboratory in which the students were given detailed written instructions to cover all the work that they were allowed to do. At the other end would be a laboratory in which the students determine and carry out their own experiments without intervention from the teacher.

It is realised that these questions may not be appropriate at all in some schools or in some countries. They are all grouped together at the end of the test instruments IEA/5K and IEA/12K, and can therefore be omitted if necessary.

Notes for interpretation and translation

Populations I, II and IV

Item 1 (interest in Science) mean : 1.8 discrimination : .40
"marks" may be translated as "grades" or some other indication of the quality of work.

Item 2 (interest in Science) mean : 1.7 discrimination : .36

Item 3 (interest in Science) mean : 1.5 discrimination : .46
If the study of Science is not optional, a National Center may wish to substitute a statement "I look forward to studying Science after ......"

Item 4 (interest in Science) mean : 1.4 discrimination : .37

Item 5 (interest in Science) mean : 2.3 discrimination : .35
"exhibition", "exposition" or "library" may be substituted for "museum" if more appropriate.

Item 6 (interest in Science) mean : 2.7 discrimination : .26
"club" here means any gathering, formal or informal, at which attendance is voluntary.

Item 7 (interest in Science) mean : 2.2 discrimination : .31

Item 8 (interest in Science) mean : 2.7 discrimination : .30
It is understood that this in an uncommon activity, and it should not be replaced merely for this reason. If it seems clear that only 2% or fewer of 10-year-old students are likely to be able to respond positively to this item, then an alternative should be substituted, although it is requested that the substitute be also a fairly complex scientific activity.

Item 9 (interest in Science) mean : 2.1 discrimination : .37

Item 10 (interest in Science) mean : 2.1 discrimination : .31

Item 11 (interest in Science) mean : 1.9 discrimination : .40
National Centers may substitute any type of Science book or magazine other than school text book.

Item 12 (interest in Science) mean : 2.6 discrimination : .38
If telescopes are rare or unknown, then any deliberate astronomical activity is acceptable.

Item 13 (interest in Science) mean : 2.5 discrimination : .34

Item 14 (interest in Science) mean : 2.5 discrimination : .32

Item 15 (interest in Science) mean : 2.6 discrimination : .34

Item 16 (interest in Science) mean : 2.4 discrimination : .35

Populations II and IV only

Item 17 (Science and the self) mean : 3.5 discrimination : .62

Item 18 (Science in the world) mean : 3.5 discrimination : .58
"the world" here may be taken to mean the general natural and cultural environment of mankind.

Item 19 (Science and the self) mean : 2.3 discrimination : .50
This item deals with the jargon and other unfamiliar words required by academic Science.

Item 20 (Science in the world) mean : 4.0 discrimination : .55

Item 21 (Science and the self) mean : 2.8 discrimination : .69
The intent of this item is that Science is a subject that is difficult to study, not necessarily that the student obtains poor grades for it.

Item 22 (Science in the world) mean : 4.1 discrimination : .61
This is aomewhat colloquial, and a literal translation may not be appropriate.

Item 23 (Science and the self) mean : 3.9 discrimination : .61
"listening to the radio" may be substituted for "watching T.V."

Item 24 (Science in the world) mean : 3.7 discrimination : .50

Item 25 (Science and the self) mean : 2.8 discrimination : .58
This refers to the study of Science in school.

Item 26 (Science in the world) mean : 3.1 discrimination : .61

Item 27 (Science and the self) mean : 3.7 discrimination : .65

Item 28 (Science in the world) mean : 3.4 discrimination : .67
National Centers may substitute other words for "slaves" and "machines" to avoid the translated form appearing clumsy. The idea to get across is that machines are becoming the masters of the human race.

Item 29 (descriptive : text book - experimental) mean : 1.8 average F value : 3.7
This item implies that the student or teacher carries out experimental work or demonstrations, and not that the Science that is learned is composed of descriptions of experimental work carried out by other people.

Item 30 (descriptive : text book - experimental) mean : 2.0 average F value : 3.3
The item is intended to imply that the teacher regards the content of the text book as being adequate coverage of his curriculum, and regards the text book as important.

Item 31 (descriptive : text book - experimental) mean : 1.8 average F value : 2.8
This question may be reworded to include forms of written source material other than the Science text book.

Item 32 (descriptive : text book - experimental) mean : 1.2 average F value : 2.5
"We have" could be translated as "We use".

Item 33 (descriptive : text book - experimental) mean : 1.9 average F value : 3.2
If this item seems inappropriate to the local conditions, it may be replaced by a statement which implies that the Science homework is devoted to Science related activities separate from learning material in the text book or solving problems taken therefrom.

Item 34 (descriptive : text book - experimental) mean : 1.5 average F value : 3.0
We are interested here in the allocation of time between the two modes of activity to the extent that they can be distinguished.

Item 35 (descriptive : text book - experimental)
Note that this item has been revised. The new form is given in the errata section of the yellow bulletin.

Item 36 (descriptive : text book - experimental) mean : 1.9 average F value : 3.1

Item 37 (descriptive : text book - experimental) mean : 2.0 average F value : 2.7
"outside school" can include both outside regular school hours and outside the school classroom. It covers all extra-mural or extra-curricular scientific activities.

Item 38 (descriptive : text book - experimental) mean : 1.6 average F value : 3.0

Item 39 (descriptive : text book - experimental) mean : 1.9 average F value : 2.2
In those countries using the English language, we suggest that the word "using" be replaced by "the use of".

Item 40 (descriptive : text book - experimental) mean : 1.8 average F value : 4.7
This item differs from item 38 in that it does not imply necessarily that a laboratory is available.

NOTE After question 40 there is an instruction to the students that they need not answer questions 41 to 48 if they have answered "Never" to question 40. This wording should be changed to : "If you do not do any laboratory work during your Science lessons, you do not need to answer questions 41 to 48." The test administrators should decide whether these questions are appropriate or not for the whole class and an appropriate instruction to this effect should be included in the instructions to test administrators (that is, Manual 3).

Item 41 (descriptive : laboratory : structured - unstructured)
mean : 1.4 average F value : 3.0

Item 42 (descriptive : laboratory : structured - unstructured)
mean : 2.1 average F value : 7.4

Item 43 (descriptive : laboratory : structured - unstructured)
mean : 2.3 average F value : 2.7

Item 44 (descriptive : laboratory : structured - unstructured)
mean : 2.1 average F value : 3.4

Item 45 (descriptive : laboratory : structured - unstructured)
mean : 1.7 average F value : 4.7
This item implies that the students do carry out the experiments after they have been demonstrated, and this point must be made clear.

Item 46 (descriptive : laboratory : structured - unstructured)
mean : 2.0 average F value : 3.5

Item 47 (descriptive : laboratory : structured - unstructured)
mean : 1.9 average F value : 3.1
The intent of this item is to discover if while allowing the students considerable freedom the teacher helps to structure the situation by posing questions which are intended to help the student direct his activities.

Item 48 (descriptive : laboratory : structured - unstructured)
mean : 2.2 average F value : 4.3
This question is different from question 42 in that it suggests not merely a written outline of the experimental work is provided, but detailed instructions covering every piece of student behaviour.

IEA/1K

THE PLACE OF SCIENCE
IN THE SCHOOL
AND IN THE WORLD OUTSIDE

These questions are being given to a number of children in several countries to find out what they think about Science and the part it plays in their lives. For most of the questions there are no right or wrong answers, so this is NOT a test. We just want to know what you think.

When you are told to do so, work through the questions, indicating the answers you want to give. If you want to change an answer you have given, you may, but be sure to erase the mark for the old answer.

For each of these four questions, select the best answer, and indicate it by marking the appropriate letter.

1. The marks I get in Science are usually ....

   A. better than in most other subjects.
   B. about average compared with other subjects.
   C. worse than in most other subjects.

2. I like Science ....

   A. more than most other subjects.
   B. about the same as other subjects.
   C. less than most other subjects.

3. I would like to study Science after the end of this school year.

   A. Yes.
   B. Not sure.
   C. No.

4. I hope that in my career I will be able to make use of some of the Science I learned at school.

   A. Yes.
   B. Not sure.
   C. No.

Below is a list of things you might do outside school. Look at each one and if it is something you do very often or used to do very often, mark A. If you have ever done it at all, mark B. If you have never done it, mark C.

5. Visit a Science museum.

   A. Often.
   B. Sometimes.
   C. Never.

6. Go to meetings of a scientific club.

   A. Often.
   B. Sometimes.
   C. Never.

7. Build working models of ships, cars or aeroplanes.

   A. Often.
   B. Sometimes.
   C. Never.

8. Build a radio set or other piece of electronic apparatus.

   A. Often.
   B. Sometimes.
   C. Never.

9. Visit an airfield to watch the planes.

   A. Often.
   B. Sometimes.
   C. Never.

10. Visit a harbour to watch the ships.

   A. Often.
   B. Sometimes.
   C. Never.

11. Read a science fiction book.

   A. Often.
   B. Sometimes.
   C. Never.

12. Look at the moon or the planets through a telescope.

   A. Often.
   B. Sometimes.
   C. Never.

13. Do Chemistry experiments with your own equipment.

   A. Often.
   B. Sometimes.
   C. Never.

Below is a list of some things you may do. If you do, mark A. If you do not, but would like to, mark B. If you are not interested to do it, mark C.

14. Make a hobby of studying or collecting flowers or leaves.

A. I do it.
B. I would like to.
C. I am not interested.

15. Make a hobby of studying or collecting insects.

A. I do it.
B. I would like to.
C. I am not interested.

16. Make a hobby of studying or collecting rocks or fossils.

A. I do it.
B. I would like to.
C. I am not interested.

For the following questions indicate whether each of the statements is usually true for you in your school.

17. We have regular Science lessons.

A. Yes.
B. No.

18. We have a textbook for Science.

A. Yes.
B. No.

19. Our Science lessons include laboratory experiments in which we all take part.

A. Yes.
B. No.

20. We make observations and do experiments during our Science lessons.

A. Yes.
B. No.

21. The teacher gives us questions to answer while we do our experiments.

A. Yes.
B. No.

22. We usually make up our own problems and design our own experiments.

A. Yes.
B. No.

Accompanying Notes for IEA/2H, IEA/6H and IEA/13H

General

These instruments contain three scales and are the result of the extensive pruning which took place after the Council Meeting in Hamburg. Many of the items, particularly those in the "like school" scale, have been tried out extensively. Other items have not yet been tried out at all. It is hoped that National Centers will administer these instruments in the current form to students during the Dry Run. If it is necessary to omit an entire scale, then this can be done, although arrangements for recording the data may be somewhat complicated. If a National Center feels it is essential to change one or two items in order to make them acceptable, then this can of course be done, although it is important that the Coordinator be informed. Some notes, which are intended as a guide to translation and which sometimes suggest alternative items, are indicated below.

"I like school" scale

This scale is intended to be the same for Populations I, II and IV. Some 30 items were tried out initially in England. A reduced list of 10 was included in IEA/ATT/GEN/1 and data for this instrument from seven countries has now been analysed. The items in general seemed to be sound, with reliability estimates averaging 0.8. A slight rewording was proposed for one of the items, and two other items proposed by National Centers have since been added, so that the scale now contains 12 items.

Need-achievement scale

The difficulties encountered in putting this scale together have already been reported. A selection of items was tried out in IEA/ATT/GEN 3 and IEA/ATT/GEN/5. Although the data from one or two countries has now been returned for analysis, we are not yet able to come to any conclusion about the items. However, many comments have been received, both before and since the Council Meeting, and as a result a set of 12 items (mostly taken from the Aberdeen Academic Motivation Inventory of Dr. N. J. Entwhistle) has been compiled for Populations II and IV. It is expected that this scale, if it works at all, will correlate positively with a liking for school, but this does not make it redundant.

For Population I, it was felt that the items about homework and leaving school were less appropriate, and it is therefore proposed that four other items dealing with need for achievement outside school be substituted. These are items 16, 17, 18 and 19.

Descriptive scale : authoritarian-permissive school environment

The results from IEA/ATT/GEN/1 suggested that such a scale was possible. Typical F values for between-school/within-school variance were 8.0. However, it is clear that these questions must be worded very carefully if they are to be acceptable in most of the participating countries. An attempt has been made to remove sensitive questions, and one or two new ones suggested by National Centers have been included.

Notes for interpretation and translation

Item 1 (like school) % agreement : 26 average discrimination : .61
The intent of this question is to discover whether the child prefers that part of the day which he spends in school to the time he spends elsewhere.

Item 2 (n-ach.)
"do well" connotes "get good grades, score high marks, pass examinations, etc."

Item 3 (like school) % agreement : 80 average discrimination : .57
"work" here means academic work.

Item 4 (n-ach.)
This question deals with the problem of concentration and paying attention. It may be that National Centers will wish to reword this item extensively.

Item 5 (n-ach.)

Item 6 (like school) % agreement : 93 average discrimination : .75
The results above refer to IEA/ATT/GEN/1. The wording has been slightly changed since then.

Item 7 (n-ach.)
This item deals with the perception of self as a discipline problem.

Item 8 (like school) % agreement : 74 average discrimination : .48
National Centers may wish to reword this question. The idea to be included is that of obtaining as much educational experience as possible.

Item 9 (n-ach.)
See note for item 2.

Item 10 (like school) % agreement : 12 average discrimination : .44

Item 11 (like school) % agreement : 60 average discrimination : .76
The wording has been somewhat changed from the form in IEA/ATT/GEN/1. If the word "challenging" is difficult to translate, then "exciting" and "stimulating" are possible alternatives.

Item 12 (n-ach.)
See note for question 4, although this item is concerned with work in general.

Item 13 (like school) % agreement : 66 average discrimination : .71

Item 14 (n-ach.)
"hard" means "diligently".

Item 15 (like school) % agreement : 42 average discrimination : .57
Substitute other breaks in the school routine if applicable.

Item 16 (n-ach.)
Population I : "invented" need not be taken literally. The translation should connote "originated" and"developed."
Populations II and IV : this question may need rewording if homework is not a common practice.

Item 17 (n-ach.)
Population I : National Centers may substitute another activity implying "initiating" or "competitive" behaviour if more applicable.

Item 18 (n-ach.)
Populations II and IV : if this item is inapplicable, substitute some other behaviour implying a low priority being given to school work.

Item 19 (n-ach.)
Population I : "games" here means "sports" and other competitive, non-intellectual pursuits.
Populations II and IV : "leave school" implies "end school career", not "go home at end of day".

Item 20 (like school) New item.

Item 21 (like school) New item.
Substitute other forms of higher education if"College or University" seems unrealistic for the children concerned.

Item 22 (n-ach)
"lower marks" could mean "poorer grades" or criticism from the teacher after a test.

Item 23 (like school) % agreement : 54 average discrimination : .62
Another phrase implying high valuation of school can be substituted if desired.

Item 24 (like school) New item.
An alternative statement implying a preference for not attending school would be acceptable.

Item 25 (school description) % agreement : 47
This item attempts to investigate the pressure for conformity of ideas.

Item 26 (school description) % agreement : 62
Some National Centers do not like this item in its present form, but they are asked to include it if possible. It attempts to measure the extent to which the informal periods spent by the children in school are governed by rules and regulations. National Centers may, of course, substitute an alternative which will measure the existence of these rules.

Item 27 (school description) % agreement : 51
"small" may be translated as "unimportant" and "insignificant". This item probes the emotional authority structure of the school.

Item 28 (school description) % agreement : 66
This item has been extensively reworded since its use in IEA/ATT/GEN/1. Its intention is to examine the existence of formal rules and discipline before the beginning of the academic school day. National Centers may substitute other equivalent behaviours.

Item 29 (school description) % agreement : 54

Item 30 (school description) % agreement : 52
"good grades" may be translated as "high marks", "examination passes", or the like.

Item 31 (school description) % agreement : 28
"criticize" should be taken in its negative (that is, destructive) sense.

Item 32 (school description) % agreement : 57
In countries where this question seems inappropriate, another may be substituted. The intention is to discover whether any formal mark of respect is paid to the teacher at the beginning of a class session.

Item 33 (school description) % agreement : 61
In countries where no students have this choice, it is suggested that an alternative statement be included, such as the following : "The students can choose special projects to work on in some of our classes."

Item 34 (school description) % agreement : 47
If homework is not applicable, use some other phrase denoting work done by the students while not under the close supervision of their teacher.

Item 35 (school description) New item.
See note for item 34.

Item 36 (school description) New item.
National Centers may find it possible to state this item more simply. The distinction required is that between students who will not work and students who can not work. It is suggested that this distinction will be made in the more authoritarian schools and will not be made in permissive schools.

These questions are being put to a large number of students in different countries to find out what they think about themselves and the schools they attend. This is NOT a test. There are no right or wrong answers. We just want to know what you think. Your teacher will not see your answers.

When you are told to do so, work through the questions indicating the answer you want to give. If you want to change an answer you have given you may, but be sure to erase the mark of the old answer.

Some of the items below are statements. Decide whether each one is generally true for you. If you agree with it, choose A ; if you disagree, choose B.

Other items are questions. Choose A or B according to whether your answer is YES or NO.

1. The most enjoyable part of my life is the time I spend in school.

   A. Agree.
   B. Disagree.

2. Is it important to you to do well at school?

   A. Yes.
   B. No.

3. I generally dislike my school work.

   A. Agree.
   B. Disagree.

4. Does your mind often wander off the subject during lessons?

   A. Yes.
   B. No.

5. Do you think school is rather a waste of time?

   A. Yes.
   B. No.

6. There are many school subjects I don't like.

   A. Agree.
   B. Disagree.

7. Do your teachers think that you misbehave too much?

   A. Yes.
   B. No.

8. I want as much education as I can get.

A. Agree.
B. Disagree.

9. Do you worry about not doing well in class?

A. Yes.
B. No.

10. I enjoy everything about school.

A. Agree.
B. Disagree.

11. I find school challenging.

A. Agree.
B. Disagree.

12. Do you find it difficult to keep your mind on your work?

A. Yes.
B. No.

13. School is not very enjoyable.

A. Agree.
B. Disagree.

14. Do you work hard most of the time?

A. Yes.
B. No.

15. The only things I can look forward to in school are weekends and holidays.

A. Agree.
B. Disagree.

16. Have you ever invented a new game?

A. Yes.
B. No.

17. Have you ever entered a competition?

A. Yes.
B. No.

18. Have you ever made something as a present for somebody?

A. Yes.
B. No.

19. Are you more interested in games than school work?

A. Yes.
B. No.

20. The only thing I like about going to school is the opportunity to meet my friends.

A. Agree.
B. Disagree.

21. I hope eventually to study at a College or University.

A. Agree.
B. Disagree.

22. If you were given lower marks than usual in a test, would this make you unhappy?

A. Yes.
B. No.

23. I agree with people who say, "school days are the happiest days."

A. Agree.
B. Disagree.

24. I would rather do more homework and spend less time at school.

A. Agree.
B. Disagree.

The remaining items in this section are statements about what happens in your school. If the statement is generally true for your school, choose A ; if not, choose B.

25. Students rarely express opinions which differ from the teacher's.

A. Agree.
B. Disagree.

26. We are not allowed to sit in our classrooms during break.

A. Agree.
B. Disagree.

27. The teachers often make you feel small.

A. Agree.
B. Disagree.

28. Students can enter the school buildings as they arrive, without waiting to be lined up by the teachers.

A. Agree.
B. Disagree.

29. The students decide for themselves where they will sit in the classroom.

A. Agree.
B. Disagree.

30. In our school good behaviour is more important than good grades.

A. Agree.
B. Disagree.

31. The teachers always seem to criticize our best ideas.

A. Agree.
B. Disagree.

32. Most teachers expect us to stand up when they come into the classroom.

A. Agree.
B. Disagree.

33. We are allowed a free choice of some of the subjects we study.

A. Agree.
B. Disagree.

34. Most of our teachers are very strict about homework.

A. Agree.
B. Disagree.

35. The teachers do not usually punish a student who admits at the beginning of a lesson that he has not done his homework.

A. Agree.
B. Disagree.

36. There is a clear distinction made in our school between students who are lazy, and those who are less talented.

A. Agree.
B. Disagree.

THE PLACE OF SCIENCE
IN THE SCHOOL
AND IN THE WORLD OUTSIDE

These questions are being given to a number of children in several countries to find out what they think about Science and the part it plays in their lives. For most of the questions there are no right or wrong answers, so this is NOT a test. We just want to know what you think.

When you are told to do so, work through the questions, indicating the answers you want to give. If you want to change an answer you have given, you may, but be sure to erase the mark for the old answer.

2/3

(Pages 2 and 3 are the same as those for IEA/1K)

Below is a list of some things you may do. If you do, mark A. If you do not, but would like to, mark B. If you are not interested to do it, mark C.

14. Make a hobby of studying or collecting flowers or leaves.

A. I do it.
B. I would like to.
C. I am not interested.

15. Make a hobby of studying or collecting insects.

A. I do it.
B. I would like to.
C. I am not interested.

16. Make a hobby of studying or collecting rocks or fossils.

A. I do it.
B. I would like to.
C. I am not interested.

For each of the following statements, please decide whether or not you agree with it, and then indicate this by choosing the appropriate letter. If you STRONGLY AGREE, mark A. If you AGREE, mark B. If you ARE UNCERTAIN, mark C. If you DISAGREE, mark D. If you STRONGLY DISAGREE, mark E.

17. I like reading about Science.

A. I strongly agree.
B. I agree.
C. I am uncertain.
D. I disagree.
E. I strongly disagree.

18. Science is steadily destroying the world.

A. I strongly agree.
B. I agree.
C. I am uncertain.
D. I disagree.
E. I strongly disagree.

19. Science has many technical terms which are hard to remember.

A. I strongly agree.
B. I agree.
C. I am uncertain.
D. I disagree.
E. I strongly disagree.

20. Science helps to make the world a better place to live in.

A. I strongly agree.
B. I agree.
C. I am uncertain.
D. I disagree.
E. I strongly disagree.

21. Science is a very difficult subject.

A. I strongly agree.
B. I agree.
C. I am uncertain.
D. I disagree.
E. I strongly disagree.

22. Science is no good for people.

A. I strongly agree.
B. I agree.
C. I am uncertain.
D. I disagree.
E. I strongly disagree.

23. I enjoy watching Science programmes on T.V.

A. I strongly agree.
B. I agree.
C. I am uncertain.
D. I disagree.
E. I strongly disagree.

24. Science makes life more pleasant.

A. I strongly agree.
B. I agree.
C. I am uncertain.
D. I disagree.
E. I strongly disagree.

25. There are too many facts to learn in Science.

A. I strongly agree.
B. I agree.
C. I am uncertain.
D. I disagree.
E. I strongly disagree.

26. Scientific discoveries will eventually lead to people not thinking for themselves.

A. I strongly agree.
B. I agree.
C. I am uncertain.
D. I disagree.
E. I strongly disagree.

27. I am very interested to learn all I can about Science.

A. I strongly agree.
B. I agree.
C. I am uncertain.
D. I disagree.
E. I strongly disagree.

28. Science is making us slaves to machines.

A. I strongly agree.
B. I agree.
C. I am uncertain.
D. I disagree.
E. I strongly disagree.

Science in our School

The statements in this quiz are descriptions of the sort of Science lessons students about your age have at school. They cover a range of topics about Science lessons, and it has been found that, for some people, each statement is true always, for some never, and for some occasionally.

For each of the statements on the following pages, indicate your answer according to whether for you the statement is true always, sometimes or never. Begin with question 29, and work through the questions in order.

29. We learn most of our Science through practical work and experiments.

A. Always.
B. Sometimes.
C. Never.

30. Our Science teacher tests us only on what is in the textbook.

A. Always.
B. Sometimes.
C. Never.

31. Students are encouraged to read Science magazines and reference books to become familiar with all aspects of Science.

A. Always.
B. Sometimes.
C. Never.

32. We have a textbook for Science.

A. Always.
B. Sometimes.
C. Never.

33. For Science homework we write up our laboratory and practical work.

A. Always.
B. Sometimes.
C. Never.

34. Our Science classes contain more theoretical work than practical work.

A. Always.
B. Sometimes.
C. Never.

35. We spend our Science lessons reading our textbooks.

A. Always.
B. Sometimes.
C. Never.

36. The main aim of our Science lessons is to understand our textbooks.

A. Always.
B. Sometimes.
C. Never.

37. We are encouraged to take part in fieldwork and scientific research outside school.

A. Always.
B. Sometimes.
C. Never.

38. Our Science lessons include laboratory experiments in which we all take part.

A. Always.
B. Sometimes.
C. Never.

39. Our Science homework requires using a textbook.

A. Always.
B. Sometimes.
C. Never.

40. We make observations and do experiments during our Science lessons.

A. Always.
B. Sometimes.
C. Never.

N.B. If you have answered "Never" for question 40, you do not need to answer questions 41 to 48.

41. When we work in the laboratory we are given complete instructions from the teacher as to what to do.

A. Always.
B. Sometimes.
C. Never.

42. We use a book which tells us how to do our experiments in the laboratory.

A. Always.
B. Sometimes.
C. Never.

43. We usually make up our own problems and then the teacher helps us to solve them experimentally.

A. Always.
B. Sometimes.
C. Never.

44. In class we are encouraged to devise our own projects and experiments, either individually or in groups.

A. Always,
B. Sometimes.
C. Never.

45. Our Science teacher demonstrates how to carry out the experiments before we do them.

A. Always.
B. Sometimes.
C. Never.

46. In our practical work our teacher gives us certain problems to solve and then leaves us to find our own methods and solutions.

A. Always.
B. Sometimes.
C. Never.

47. The teacher gives us questions to answer while we do our experiments.

A. Always.
B. Sometimes.
C. Never.

48. We do our practical work from laboratory cards or instructions which tell us how to carry out the experiment.

A. Always.
B. Sometimes.
C. Never.

IEA/6H
IEA/13H

These questions are being put to a large number of students in different countries to find out what they think about themselves and the schools they attend. This is NOT a test. There are no right or wrong answers. We just want to know what you think. Your teacher will not see your answers.

When you are told to do so, work through the questions indicating the answer you want to give. If you want to change an answer you have given you may, but be sure to erase the mark of the old answer.

Some of the items below are statements. Decide whether each one is generally true for you. If you agree with it, choose A ; if you disagree, choose B.

Other items are questions. Choose A or B according to whether your answer is YES or NO.

1. The most enjoyable part of my life is the time I spend in school.

A. Agree.
B. Disagree.

2. Is it important to you to do well at school?

A. Yes.
B. No.

3. I generally dislike my school work.

A. Agree.
B. Disagree.

4. Does your mind often wander off the subject during lessons?

A. Yes.
B. No.

5. Do you think school is rather a waste of time?

A. Yes.
B. No.

6. There are many school subjects I don't like.

A. Agree.
B. Disagree.

7. Do your teachers think that you misbehave too much?

A. Yes.
B. No.

8. I want as much education as I can get.

   A. Agree.
   B. Disagree.

9. Do you worry about not doing well in class?

   A. Yes.
   B. No.

10. I enjoy everything about school.

   A. Agree.
   B. Disagree.

11. I find school challenging.

   A. Agree.
   B. Disagree.

12. Do you find it difficult to keep your mind on your work?

   A. Yes.
   B. No.

13. School is not very enjoyable.

   A. Agree.
   B. Disagree.

14. Do you work hard most of the time?

   A. Yes.
   B. No.

15. The only things I can look forward to in school are weekends and holidays.

   A. Agree.
   B. Disagree.

16. Do you sometimes stay in to do homework rather than accept an invitation for a party or outing?

    A. Yes.
    B. No.

17. Do your friends think that you never take work seriously?

    A. Yes.
    B. No.

18. Do you like to leave your homework to the last minute?

    A. Yes.
    B. No.

19. Would you like to leave school as soon as possible?

    A. Yes.
    B. No.

20. The only thing I like about going to school is the opportunity to meet my friends.

    A. Agree.
    B. Disagree.

21. I hope eventually to study at a College or University.

    A. Agree.
    B. Disagree.

22. If you were given lower marks than usual in a test, would this make you unhappy?

    A. Yes.
    B. No.

23. I agree with people who say, "school days are the happiest days."

    A. Agree.
    B. Disagree.

24. I would rather do more homework and spend less time at school.

A. Agree.
B. Disagree.

The remaining items in this section are statements about what happens in your school. If the statement is generally true for your school, choose A ; if not, choose B.

25. Students rarely express opinions which differ from the teacher's.

A. Agree.
B. Disagree.

26. We are not allowed to sit in our classrooms during break.

A. Agree.
B. Disagree.

27. The teachers often make you feel small.

A. Agree.
B. Disagree.

28. Students can enter the school buildings as they arrive, without waiting to be lined up by the teachers.

A. Agree.
B. Disagree.

29. The students decide for themselves where they will sit in the classroom.

A. Agree.
B. Disagree.

30. In our school good behaviour is more important than good grades.

A. Agree.
B. Disagree.

31. The teachers always seem to criticize our best ideas.

A. Agree.
B. Disagree.

32. Most teachers expect us to stand up when they come into the classroom.

A. Agree.
B. Disagree.

33. We are allowed a free choice of some of the subjects we study.

A. Agree.
B. Disagree.

34. Most of our teachers are very strict about homework.

A. Agree.
B. Disagree.

35. The teachers do not usually punish a student who admits at the beginning of a lesson that he has not done his homework.

A. Agree.
B. Disagree.

36. There is a clear distinction made in our school between students who are lazy, and those who are less talented.

A. Agree.
B. Disagree.

QUESTIONNAIRES

GENERAL NOTES

1. Instructions for all questionnaires should encourage all respondents to give a response to every item. It is left to National Centers to frame the statement for their own countries.
2. In a number of countries, students will require some guidance from teachers in answering questionnaire items. Such guidance is appropriate and desirable. It is quite possible that, in some situations, teachers will read questionnaire items aloud, discuss points of clarification, allow time for students to supply an answer and proceed to the next item. Such a step by step approach to the completion of the student questionnaire may be necessary at the 10-year-old level in various countries where students have had little or no experience with questionnaires. Where students may be expected to give the same answer (e.g., number of students in class, grade student is in etc.) the best procedure is for the teacher to supply the answer and get all students to enter it in. It is, of course, clear that no help will be given to students when answering the tests (as opposed to the questionnaires).
3. In order to secure the most accurate information to questionnaire items, countries may wish to consider assigning several of the items as 'home tasks' for the student. Students would be asked to find out the answers to several of the items in preparation for completing the questionnaire. Such items which could profitably be assigned as 'home tasks' include: Father's Occupation and Father's and Mother's Education.
4. In the stem of most questions the word "indicate" has been used. Where the National Center has decided to use an MRC answer card, the stem will have to be changed to read something like "indicate by blackening in the appropriate space on the answer card". Where punch cards will be returned by a National Center, their stem should be changed to "indicate by circling the appropriate letter below".
5. All questions in which the response indicates the grouping of a continuous variable, a short-hand convention using the signs $\leq$ (less than or equal to) and $>$ (greater than) has been used. National Centers should translate these signs into appropriate

words for the respondents to the questionnaires. The convention has been used for the sake of accuracy.

6. A number of questionnaire items may be rephrased in national terms. For example, the item requesting the student to furnish his age may be asked in terms of birthdate. However, the coding of responses must conform to the international coding scheme. Thus, while student age may be asked in terms of birthdate, this would have to be converted into age in months.
7. Where students are requested to give a quantitative response to an item, e.g., number of hours of homework, these are to be coded to the nearest whole hour, year, etc.
8. Where a response of zero or none is given to a questionnaire item, this is to be coded 0 on the punch card. Where an individual has failed to record a questionnaire item, the appropriate column should be left blank. The distinction between a blank and a zero is an important one.
9. Wherever coding or punching schemes are being used in the coding of responses, minimum and maximum values for each variable are set forth in the international coding scheme. Where a student indicates a response which is greater than the maximum value, it is to be coded as the maximum value. Thus, if the maximum value for a certain variable is 25, a response of 30 would be coded as 25, since 25 means 25 or more.
10. Unscales Variables. Where it has been difficult to evolve an international scale which adequately represents different practices in participating countries, the variable has been designated as an international unscaled variable. National Centers are asked to formulate for each of these variables a nine-point scale which will be appropriate for use within their country and which agrees with the general outline provided. The purpose of this outline is to ensure a certain uniformity of categorisation between the different countries, that is all countries should collect data on the same dimension and ordered in the same way. It is important that National Centers transmit copies of their classificatory schemes to the Coordinator.
11. Wherever Mother Tongue is printed, the actual Mother Tongue should be inserted.

POPULATION I

ACCOMPANYING NOTES (ST 1)

Note: Please ensure that when preparing national versions of this questionnaire that the language used be appropriate for 10 year old students.

School and Student Code Numbers. These are to be developed by the National Centers. The range for both school and student numbers is 001 - 999.

Q. 3 Age of Student. This question should be asked in the way normally used in the country but will be coded in months, e.g., a student who is 10 years 2 months will be coded 122.

Q. 4 Grade in School. The intent of the question is to get at the years in the school system in which the student in now enrolled. Counting after Kindergarten level, this code indicates the grade or years of the school system in which the student is enrolled.

Q. 5 Father's Occupation. (International Unscaled Variable) National Centers should develop a set of up to nine categories which will cover the range of possible occupations in their country. The categories should be arranged such that the highest category is 9 and the lowest 1.

Categories 9, 8 and 7 should be used for professional and managerial occupations.
Categories 6, 5 and 4 for skilled workers' occupations.
Categories 3, 2 and 1 for unskilled workers' occupations.
Category 0 should be used as an "unclassified" category.

The example of how to pose the question given in the questionnaire is illustrative only. National Centers may use any procedure they wish provided that the information is collected such that the information can be categorized in the above categories.

See the General Notes for further explanation of unscaled variables.

Q. 7 Hours of Homework. Because of the very wide range of responses obtained in the international pre-testing, it was decided to leave an open-ended response to this question. The intent of the question is to get the total number of hours spent on all homework per week. This may be approached in different ways. It is possible to ask the average number of hours homework per day, but the National Center must then multiply by 5 before coding.

Alternatively in those countries where some homework is sometimes done at school, it may be necessary to ask two questions and sum the responses.

Q. 16 Daily Newspaper. In the pre-testing, confusion arose over this question because of Sunday newspapers. The aim of the question is to discover whether or not there is a regular flow of newspapers into the house. Therefore, newspapers received only once a week should be discounted. If there is a newspaper for 5 days a week, "Yes" should be checked - otherwise "No".

Q. 17 This question may be pre-coded if desired (See ST 2).

Q. 19 - 44 Subject List. We are not interested in getting detailed reactions to all school subjects including subjects peripheral to IEA's main subject interest in this phase. Thus where you think sufficient space has not been allowed in columns 19 to 44, it is legitimate to group homogeneous subjects together.

Please prepare a list to suit your own school system based on the following subject list. Only where these are courses, within one subject area, with different content, should they be listed separately. For example, if only one type of Mother Tongue course is likely to be taken by students, then list this as Q. 19. Q. 20 would then be the next subject in the list (foreign language if this is taught). If on the other hand, the Mother Tongue is taught as two separate subjects, namely Language and Literature, then Q. 19 should be Language and Q. 20 Literature, and so on. The following list is comprehensive, and it is not expected that all the items will be used. In preparation of your own subject lists, please maintain the same general order. Then please send a copy of your list with their respective question numbers to the coordinator.

01	Mother Tongue (a)
02	Mother Tongue (b)
03	Mother Tongue Literature (a)
04	Mother Tongue Literature (b)
05	French - Foreign Language (a)
06	French - Foreign Language (b)
07	English - Foreign Language (a)
08	English - Foreign Language (b)
09	Other Foreign Language (a)
10	Other Foreign Language (b)
11	General Science
12	Biology
13	Chemistry
14	Physics
15	Other Science
16	General Social Studies
17	History
18	Geography
19	Political Science
20	Other Social Studies
21	Arithmetic
22	Mathematics (a)
23	Mathematics (b)
24	Mathematics (c)
25	Other Academic Subject

Do not write here

STUDENT QUESTIONNAIRE (ST 1)

01-02 Leave Blank

Country 03-04 ____

Directions:

Please answer all of the following questions as best you can. If you have difficulty in understanding any question, raise your hand and ask your teacher for help.

1. Name of your school ____________________ 05-07 ____

Target Population 08 1

2. Print your name ____________________ 09-11 ____

Type of Card 12 J

3. How old are you? __________ years __________ months 13-15 ____

4. What is your grade in school? __________ grade 16-17 ____

5. Please write your father's occupation __________ 18 ____

____

(If your father is dead, give your guardian's occupation, or, if you do not have a guardian, give your father's occupation before he died.)

On the lines below, describe his occupation as clearly as you can. Please state the duties he performs and for whom he works. For example, if he is a "salesman", tell what he sells and where he works.

____

____

____

6. Sex (check one)

Boy ______

Girl ______ 19 ____

7. About how many hours of homework for all subjects do you do each week?

__________ hours 20-21 ____

Do not write here

8. How many students are there in your class?
____________ students 22-23 ____

9. Where do you study in your home? (check one)

In a room where the rest of the family talk, watch TV, etc. ________

In a room that is usually quiet, although people are there. ________

In a room by myself ________ 24 ____

10. Do you usually have a fixed time for doing your homework? (check one)

Yes ________

No ________ 25 ____

11. How often does your mother or father help you with your homework? (check one)

Often (at least once a week) ________

Occasionally (at most once or twice a month) ________

Never ________ 26 ____

12. When you talk at home, do your parents

always or almost always insist that you speak correctly? ________

sometimes correct your speech? ________

let you speak how you please? ________ 27 ____

13. When you write anything at home, do your parents

always or almost always check your spelling? ________

sometimes check your spelling? ________

rarely or never check your spelling? ________ 28 ____

Do not write here

14. In your spare time at home, do your parents

encourage you to read as much as possible? ____

sometimes suggest you read? ____

do not mind if you never read? ____

29 ____

15. When you get home from school, do your parents

always or almost always want to know how you have done? ____

sometimes inquire about your school work ____

never or hardly ever ask you about school ____

30 ____

16. Does your family receive a daily newspaper?

Yes ______

No ______

31 ____

17. About how many hours do you usually watch TV on a school day, outside school programs?

________ hours

32 ____

18. About how many hours did you spend reading just for your own pleasure during last week? (check one)

0 hours ____

less than 1 hour ____

1 hour but less than 2 hours ____

2 hours but less than 3 hours ____

3 hours but less than 4 hours ____

more than 4 hours ____

33 ____

Do not write here

Listed below are a number of subject studied in school. Indicate for each subject listed, either that you have never studied it, or, if you have or are doing so now, the extent to which you like or dislike it.

(National Centers see accompanying notes for preparation of subject list.)

Code No	Subject	A. Have never studied this subject	B. One of my favorite subjects	C. Have generally liked this subject	D. Have generally disliked this subject	E. One of the subjects I have liked least in school
19.	National Centers to enter names of subjects here.					
20.						
21.						
22.						
23.						
24.						
25.						
26.						
27.						
28.						
29.						
30.						
31.						
32.						
33.						
34.						
35.						
36.						
37.						
38.						
39.						
40.						
41.						
42.						
43.						
44.						

STUDENT QUESTIONNAIRE (ST 1)

CODING AND PUNCHING SHEET

Question No	Variable	Hollerith Col. Nos.	Hollerith Punching Code	Details of Code
		1-2	Leave	Blank
	Country Number	3-4	01	Australia
			02	Belgium
			03	Chile
			04	England
			05	Fed. Rep. of Germany
			06	Finland
			07	France
			08	India
			09	Iran
			10	Israel
			11	Italy
			12	Japan
			13	Netherlands
			14	Poland
			15	Scotland
			16	Sweden
			17	Thailand
			18	United States
			19	New Zealand
1	School Number	5-7	001-999	School Number-Coded by N.C.
	Target Population	8	1	Population I
2	Student Number	9-11	001-999	Student No.-Coded by N.C.
	Type of Card	12	J	General Questionnaire Card
3	Age of Student	13-15	120-132	Age in Months
4	Grade in School	16-17	01	1st Year
			02	2nd Year
			03	3rd Year
			04	4th Year
			05	5th Year
			06	6th Year
			07	7th Year
			08	8th Year
			09	9th Year
			10	10th Year
5	Father's Occup.	18	1-9	National Center Unscaled Variable

6	Sex	19	1 2	Boy Girl
7	No. of Hours All Homework per week	20-21	01-99	Number of Hours
8	Size of Class	22-23	01-60	Actual Number of Students
9	Place for Study in Home	24	1 2 3	In room with family, talk etc. In quiet room with others In room by self
10	Fixed Time for Homework	25	1 2	Yes No
11	Help with Homework	26	1 2 3	Often Occasionally Never
12	Talking at Home	27	1 2 3	Insist speak correctly Sometimes correct speech Speak how you please
13	Writing at Home	28	1 2 3	Always correct spelling Sometimes check spelling Rarely correct spelling
14	Spare-time Home	29	1 2 3	Encourage read Sometimes read Do not mind
15	Parental Interest in School	30	1 2 3	Always want to know Sometimes inquire Never ask
16	Daily Newspaper	31	1 2	Yes No
17	Hours TV per day	32	1 2 3 4 5 6 7 8 9	1 hour or less (incl. 0) ≤ 2 hours but more than 1 hour. ≤ 3 hours but more than 2 hours ≤ 4 hours but more than 3 hours ≤ 5 hours but more than 4 hours ≤ 6 hours but more than 5 hours ≤ 7 hours but more than 6 hours ≤ 8 hours but more than 7 hours More than 8 hours

18	**Hours Reading Pleasure**	33	1 2 3 4 5 6	0 hours Less than 1 hour 1 hour but less than 2 2 hours but less than 3 3 hours but less than 4 More than 4 hours
19 ↓ 44	**National Centers to enter names of subject here**	34 ↓ 59	1 2 3 4 5	Not studied One of favorites Subject I like Severely disliked this subject One I like least
		60 - 61	00 - 40	No. of correct replies for Q. 1 - 9
		62 - 63	01 - 09	No. of question reached in Reading Speed Test
		64 - 80		For National Purposes

IEA/6G IEA/13G
IEA/5S IEA/12S
IEA/7E IEA/14E
IEA/9Q

POPULATION II & IV

ACCOMPANYING NOTES (ST 2)

POPULATIONS II AND IV

Note: Please ensure that when preparing national versions of this questionnaire that the language used be appropriate for fourteen-year-old and pre-university students.

The Student Questionnaire is divided into a general section for all students to answer and separate specific subject sections. Please ensure that the specific subject sections are given to appropriate students according to the directions given in Manual 2.

These notes which now follow refer to specific items in the questionnaire and are intended to help National Centers in translating the questionnaire. If you have any further queries, please contact the coordinator immediately.

General

Ques. A,G,01 & 02, P. These questions are to be post-coded at the National Center onto the answer cards. Ques. 41 - 79 are answered by the student directly onto the MRC answer card.

Ques. A. Age of Student. This question should be asked in the way normally used in the country, but will be coded in months less 150, e.g. a student who is 14 years 2 months will be coded 20.

Ques. G. Grade in School. The intent of the question is to discover the years in the school system in which the student is now enrolled. Counting after Kindergarten level, this code indicates the grade or year of the school system in which the student is enrolled.

Ques. 01 & 02. Father's Occupation and Expected Occupation. (International Unscaled Variable) National Centers should develop a set of up to nine categories which will cover the range of possible occupations in their country. The categories should be arranged such that the highest category is 9 and the lowest 1.

Categories 9, 8 and 7 should be used for professional and managerial occupations.

Categories 6, 5 and 4 for skilled workers' occupations

Categories 3, 2 and 1 for unskilled workers' occupations.

Category 0 should be used as an "unclassified" category.

The example of how to pose the question given in the questionnaire is illustrative only. National Centers may use any procedure they wish provided that the information is collected such that the information can be categorized in the above categories.

See the General Notes for further explanation of unscaled variables.

Ques. P Program. The intent of this questions is to secure information to enable classification of each student into the type of program (e.g. academic, vocational or general) in which he is enrolled. In some countries it might be possible to code all students in a particular school in the same way; each National Center must decide on how to do this. However, the information must be coded according to the international code.

Q. 42 & 43 Parents' Education. This question should be asked in the way normally used in the country. Ask the question in such a way that a student is able to answer in terms of the International Code on answer cards. Because of some of the comments received about the pre-testing of these questions, it is strongly urged that these questions are set as 'home tasks' (see General Notes). Sometimes countries have a tradition whereby persons will continue part-time education for further qualifications. If this part-time education is substantial enough, National Centers may wish to sum this into full-time equivalence.

Q. 45 When rephrasing this question into national terms, it is important to obtain the number of years of all additional education expected, i.e., not just secondary schooling. In the pre-testing, it was pointed out that some 14-year-olds were uncertain. We prefer not to allow an uncertain category. In the administration students should be encouraged to arrive at a realistic estimate, with the teachers' help if necessary.

Q. 53 If it is not common in your country for children to visit museums or concerts, please insert equivalent cultural experiences. Report any changes to the coordinator.

Q. 54 - 79 Subject List: We are not interested in getting detailed reactions to all school subjects including subjects peripheral to IEA's main subject interest in this phase. Thus where you think sufficient space has not been allowed in columns 54 - 79, it is legitimate to group homogeneous subjects together.

Please prepare a list to suit your own school system based on the following subject list. Only where these are courses, within one subject area, with different content, should they be listed separately. For example, if only one type of Mother Tongue course is likely to be taken by students, then list this as Q. 54. Q. 55 would then be the next subject in the list (foreign language if this is taught). If on the other hand, the Mother Tongue is taught as two separate subjects, namely Language and Literature, then Q. 54 should be Language and Q. 55 Literature, and so on. The following list is comprehensive, and it is not expected that all the items will be used. In preparation of your own subject lists, please maintain the same general order. Then please send a copy of your list with their respective question numbers to the coordinator.

01	Mother Tongue (a)
02	Mother Tongue (b)
03	Mother Tongue Literature (a)
04	Mother Tongue Literature (b)
05	French - Foreign Language (a)
06	French - Foreign Language (b)
07	English - Foreign Language (a)
08	English - Foreign Language (b)
09	Other Foreign Language (a)
10	Other Foreign Language (b)
11	General Science
12	Biology
13	Chemistry
14	Physics
15	Other Science
16	General Social Studies
17	History
18	Geography
19	Political Science
20	Other Social Studies
21	Arithmetic
22	Mathematics (a)
23	Mathematics (b)
24	Mathematics (c)
25	Other Academic Subject

SCIENCE

Q. 1 National Centers may wish to put a general instruction in front of Q. 1 indicating that if the student is not currently taking any Science course, he should go straight to Q. 21, and also make the appropriate indication in front of Q. 21.

Q. 10, 15, 20 & 25. If these questions are checked in your country, please inform the coordinator or the most frequent 'other' subject.

READING COMPREHENSION

Q. 1 - 3 Where Mother Tongue is stated in parentheses, the actual Mother Tongue should be printed.

Q. 5 - 32 On the assumption that students taking Literature will also have taken Reading Comprehension, these questions will also be used in the Literature Study.

Q. 21 In the pre-testing, confusion arose over this question because of Sunday newspapers. The aim of the question is to discover whether or not there is a regular flow of newspapers into the house. Therefore, newspapers received only once a week should be discounted. If there is a newspaper for 5 days a week 'Yes' should be checked - otherwise 'No'.

LITERATURE

Since all of these questions, except for Q. 16, require a student to be studying literature, it is anticipated that these will be given to only those students currently studying literature from among all those having taken the tests.

Q. 3 If Literature is together with Language, then the teacher must help the students to estimate the Literature part.

IEA/6G
IEA/13G

STUDENT QUESTIONNAIRE (ST 2)

GENERAL SECTION

Directions:

Please answer all of the following questions as best you can. If you have difficulty in understanding any question, raise your hand and ask your teacher for help.

A. How old are you? ____________years ___________months

G. What is your grade in school? _______________grade

O1. Please write your father's occupation. __________________

(If your father is dead, give your guardian's occupation, or, if you do not have a guardian, give your father's occupation before he died.)

On the lines below, describe his occupation as clearly as you can. Please state the duties he performs and for whom he works. For example, if he is a "salesman", tell what he sells and where he works.

____

____

____

O2. What occupation do your expect to enter after you have finished your schooling?

(Please describe this occupation as clearly as your can. State the specific duties of the occupation you expect to perform. For example, if you expect to be a "salesman", state what you expect to sell. Also state what type of organization you expect to work for. For example, if you expect to be a clerk, state whether you expect to work for a private firm, a governmental organization, etc.)

____

____

____

P. (National Centers to ask question to determine the program or course of studies in which the student is enrolled- see accompanying notes and General Notes.)

41. Sex (indicate one)

A. Boy

B. Girl

42. How many years of full-time education (including University) does your father have?

A. 0 years B. $> 0 \leq 5$ C. $> 5 \leq 10$

D. $> 10 \leq 15$ E. > 15

43. How many years of full-time education (including University) does your mother have?

A. 0 years B. $> 0 \leq 5$ C. $> 5 \leq 10$

D. $> 10 \leq 15$ E. > 15

44. About how many hours of homework for all subjects do you do each week?

A. $0 \leq 2$ B. $> 2 \leq 5$ C. $> 5 \leq 10$

D. $> 12 \leq 20$ E. > 20

45. After this year, how many more years of full-time education do you expect to receive?

A. 0 years B. ≤ 2 C. $> 2 \leq 5$

D. $> 5 \leq 8$ E. > 8

46. Where do you usually study in your home? (indicate one)

A. In a room where the rest of the family talk, watch TV, etc.

B. In a room that is usually quiet, although people are there

C. In a room by myself

47. Do you usually have a fixed time for doing your homework? (indicate one)

A. Yes

B. No

48. Does your mother or father help you with your homework? (indicate one)

A. Often (at least once a week)

B. Occasionally (at most once or twice a month)

C. Never

49. When you talk at home, do your parents (indicate one)

A. always or almost always insist you speak correctly?

B. sometimes correct your speech?

C. let you speak how you please?

50. When you write anything at home, do your parents (indicate one)

A. always or almost always check your spelling?

B. sometimes check your spelling?

C. rarely or never check your spelling?

51. In your spare time at home, do your parents (indicate one)

A. encourage you to read as much as possible?

B. sometimes suggest you read?

C. do not mind if you never read?

52. When you get home from school, do your parents (indicate one)

A. always or almost always want to know how you have done?

B. sometimes inquire about your school work?

C. never or hardly ever ask your about school?

53. Out of school hours, do your parents (indicate one)

A. often encourage you to visit museums or concerts?

B. occasionally suggest you visit museums or concerts?

C. do not care whether you go to a museum or concert?

Listed below are a number of subjects studied in school. Indicate for each subject listed, either that you have never studied it, or, if you have or are doing so now, the extent to which you like or dislike it.

(National Centers see accompanying notes for preparation of subject list.)

Code No	**Subject**	A. Have never studied this subject	B. One of my favorite subjects	C. Have generally liked this subject	D. Have generally disliked this subject	E. One of the subjects I have liked least in school
54.	**National Centers to enter names of subjects here.**	A.	B.	C.	D.	E.
55.		A.	B.	C.	D.	E.
56.		A.	B.	C.	D.	E.
57.		A.	B.	C.	D.	E.
58.		A.	B.	C.	D.	E.
59.		A.	B.	C.	D.	E.
60.		A.	B.	C.	D.	E.
61.		A.	B.	C.	D.	E.
62.		A.	B.	C.	D.	E.
63.		A.	B.	C.	D.	E.
64.		A.	B.	C.	D.	E.
65.		A.	B.	C.	D.	E.
66.		A.	B.	C.	D.	E.
67.		A.	B.	C.	D.	E.
68.		A.	B.	C.	D.	E.
69.		A.	B.	C.	D.	E.
70.		A.	B.	C.	D.	E.
71.		A.	B.	C.	D.	E.
72.		A.	B.	C.	D.	E.
73.		A.	B.	C.	D.	E.
74.		A.	B.	C.	D.	E.
75.		A.	B.	C.	D.	E.
76.		A.	B.	C.	D.	E.
77.		A.	B.	C.	D.	E.
78.		A.	B.	C.	D.	E.
79.		A.	B.	C.	D.	E.

IEA/5S
IEA/12S

STUDENT QUESTIONNAIRE (ST 2)

SCIENCE

Listed below are a number of different Science subjects. For each subject which you are currently taking, please indicate the number of students in that class. If you are not currently taking a particular Science course, do not answer the question.

1. General Science

A. 15 or less B. 16-25 C. 26-35
D. 36-45 E. 46-55 F. 56 or more

2. Biology (including Zoology and/ or Botany)

A. 15 or less B. 16-25 C. 26-35
D. 36-45 E. 46-55 F. 56 or more

3. Chemistry

A. 15 or less B. 16-25 C. 26-35
D. 36-45 E. 46-55 F. 56 or more

4. Physics

A. 15 or less B. 16-25 C. 26-35
D. 36-45 E. 46-55 F. 56 or more

5. Other Science subjects

A. 15 or less B. 16-25 C. 26-35
D. 36-45 E. 46-55 F. 56 or more

For each of the subjects listed below, indicate about how many hours of homework you do each week. If you are not currently taking a particular Science course, do not answer the question.

6. General Science

A. 0 hours B. $>0 \leq 2$ C. $>2 \leq 5$

D. $>5 \leq 10$ E. $>10 \leq 15$ F. >15

7. Biology (including Zoology and/or Botany)

A. 0 hours B. $>0 \leq 2$ C. $>2 \leq 5$

D. $>5 \leq 10$ E. $>10 \leq 15$ F. >15

8. Chemistry

A. 0 hours B. $>0 \leq 2$ C. $>2 \leq 5$

D. $>5 \leq 10$ E. $>10 \leq 15$ F. >15

9. Physics

A. 0 hours B. $>0 \leq 2$ C. $>2 \leq 5$

D. $>5 \leq 10$ E. $>10 \leq 15$ F. >15

10. Other Science subjects

A. 0 hours B. $>0 \leq 2$ C. $>2 \leq 5$

D. $>5 \leq 10$ E. $>10 \leq 15$ F. >15

If your are currently taking a Science course, please indicate how many hours a week you spend in doing experiments in the laboratory for the subjects you are taking. If your are not currently taking a Science course, do not answer the question.

11. General Science

A. ≤ 2 B. $> 2 \leq 5$ C. $> 5 \leq 8$

D. $> 8 \leq 10$ E. > 10

12. Biology

A. ≤ 2 B. $> 2 \leq 5$ C. $> 5 \leq 8$

D. $> 8 \leq 10$ E. > 10

13. Chemistry

A. ≤ 2 B. $> 2 \leq 5$ C. $> 5 \leq 8$

D. $> 8 \leq 10$ E. > 10

14. Physics

A. ≤ 2 B. $> 2 \leq 5$ C. $> 5 \leq 8$

D. $> 8 \leq 10$ E. > 10

15. Other Science Subjects

A. ≤ 2 B. $> 2 \leq 5$ C. $> 5 \leq 8$

D. $> 8 \leq 10$ E. > 10

If your are currently taking a Science course, please indicate how many hours a week of instruction (including laboratory work) you receive in the subjects listed below. If you are not currently taking a course, do not answer the question.

16. General Science

A. ≤ 2 B. $>2 \leq 5$ C. $>5 \leq 10$

D. $>10 \leq 15$ E. >15

17. Biology (including Zoology and/or Botany)

A. ≤ 2 B. $>2 \leq 5$ C. $>5 \leq 10$

D. $>10 \leq 15$ E. >15

18. Chemistry

A. ≤ 2 B. $>2 \leq 5$ C. $>5 \leq 10$

D. $>10 \leq 15$ E. >15

19. Physics

A. ≤ 2 B. $>2 \leq 5$ C. $>5 \leq 10$

D. $>10 \leq 15$ E. >15

20. Other Science subjects

A. ≤ 2 B. $>2 \leq 5$ C. $>5 \leq 10$

D. $>10 \leq 15$ E. >15

Including this year, indicate how many years you have studied each of the subjects listed below.

21. General Science

A. ≤ 1 B. $> 1 \leq 3$ C. $> 3 \leq 5$

D. $> 5 \leq 8$ E. > 8

22. Biology (including Zoology and/or Botany)

A. ≤ 1 B. $> 1 \leq 3$ C. $> 3 \leq 5$

D. $> 5 \leq 8$ E. > 8

23. Chemistry

A. ≤ 1 B. $> 1 \leq 3$ C. $> 3 \leq 5$

D. $> 5 \leq 8$ E. > 8

24. Physics

A. ≤ 1 B. $> 1 \leq 3$ C. $> 3 \leq 5$

D. $> 5 \leq 8$ E. > 8

25. Other Science subjects

A. ≤ 1 B. $> 1 \leq 3$ C. $> 3 \leq 5$

D. $> 5 \leq 8$ E. > 8

26. If you are not now studying any Science subject, please indicate when you took your last Science course. (Indicate one)

A. Last year

B. Two years ago

C. Three years ago

D. Four or more years ago

E. Never took a Science course

27. How important has knowledge of Mathematics been to you in studying Science (indicate one)

A. It has been very important; I could not have learned Science without it.

B. It has been important, but I could have learned Science without it.

C. It has not been important, but it has helped me on occasions.

D. It has been of no importance; I have not needed it to learn Science.

28. In Science do (or did) you prefer doing experiments in the laboratory rather than solving problems from the text book? (indicate one)

A. I prefer solving problems from text books.

B. I prefer laboratory work.

C. I like both of them about the same.

D. I have not had any laboratory work.

IEA/7E
IEA/14E

STUDENT QUESTIONNAIRE (ST 2)

READING COMPREHENSION

1. Indicate how many students are in your (Mother Tongue) class.

A. 15 or less
B. 16 - 25
C. 26 - 35
D. 36 - 45
E. 46 - 55
F. 56 or more

2. Indicate about how many hours of homework you do each week in (Mother Tongue) excluding Literature.

A. 0 hours
B. $> 0 \leq 2$
C. $> 2 \leq 5$
D. $> 5 \leq 10$
E. $> 10 \leq 15$
F. > 15

3. Indicate about how many hours of instruction you receive in (Mother Tongue) excluding Literature.

A. < 2
B. $> 2 \leq 4$
C. $> 4 \leq 6$
D. $> 6 \leq 10$
E. $> 10 \leq 15$
F. > 15

4. Indicate about how many different books you studied from during the past week (all subjects).

A. < 5
B. $> 5 \leq 10$
C. $> 10 \leq 15$
D. $> 15 \leq 20$
E. $> 20 \leq 25$
F. > 25

5. Indicate about how many different magazines your family receives each month.

A. 0 magazines
B. 1 magazine
C. 2 magazines
D. 3 magazines
E. 4 or more

6. Indicate about how many hours you spent reading just for your own pleasure during the last week.

A. ≤ 2
B. $> 2 \leq 5$
C. $> 5 \leq 10$
D. $> 10 \leq 15$
E. > 15

Indicate how frequently you like to read books or magazine articles dealing with: (Indicate one response for each row)

		A. Not at all	B. Occasionally	C. Frequently
7.	Adventure	A.	B.	C.
8.	History and Biography	A.	B.	C.
9.	Science/ Technical Reading	A.	B.	C.
10.	Science Fiction	A.	B.	C.
11.	Travel and Exploration	A.	B.	C.
12.	Current Events	A.	B.	C.
13.	Mystery and Detective	A.	B.	C.
14.	Art	A.	B.	C.
15.	Politics and Economics	A.	B.	C.
16.	Philosophy and Religion	A.	B.	C.
17.	Sports	A.	B.	C.
18.	Love Stories	A.	B.	C.
19.	Humour	A.	B.	C.
20.	Myths and Legends	A.	B.	C.

21. Does your family receive a daily newspaper? (Indicate one)

A. Yes B. No

Indicate the parts of the newspaper that you usually read.

22. News

A. Yes B. No

23. Sports

A. Yes B. No

24. Comment and editorials about the news

A. Yes B. No

25. Articles about the home (cooking, clothes, and decorating)

A. Yes B. No

26. Movie, play and television reviews

A. Yes B. No

27. Music and art reviews

A. Yes B. No

28. Book reviews

A. Yes B. No

29. Comic sections and humour

A. Yes B. No

30. Indicate about how many hours a week you usually spend listening to the radio or watching television.

A. None B. $> 0 \leq 5$ C. $> 5 \leq 10$

D. $> 10 \leq 20$ E. > 20

31. Indicate about how many times a month you usually go to the movies or a show.

A. 0 times B. 1 - 2 C. 3 - 5

D. 6 - 10 E. 11 or more

32. From the following list indicate the one type of TV or radio program you like best.

A. Programs teaching some subject

B. Quiz programs

C. Programs on history, travel, nature, scientific developments, etc.

D. Variety programs

E. News programs

F. Shows that tell a story

G. Sport

H. Music

IEA/9Q

STUDENT QUESTIONNAIRE (ST 2)

LITERATURE

1. Indicate how many students there are in the class in which you study literature.

A. 15 or less B. 16 - 25 C. 26 - 35

D. 36 - 45 E. 46 - 55 F. 56 or more

2. Indicate about how many hours of homework you do each week in literature.

A. 0 hours B. $> 0 \leq 2$ C. $> 2 \leq 5$

D. $> 5 \leq 10$ E. $> 10 \leq 15$ F. > 15

3. Indicate about how many hours of instruction you receive each week in Literature.

A. < 2 B. $> 2 \leq 4$ C. $> 4 \leq 6$

D. $> 6 \leq 10$ E. $> 10 \leq 15$ F. > 15

4. Including this year, indicate how many years you have studied literature.

A. 1 year

B. 2 years

C. 3 years

D. 4 - 5 years

E. 6 - 7 years

F. 8 or more years

5. Indicate the proportion of your time in (Mother Tongue) class which is devoted to literature as opposed to composition, language study, and the like. (indicate one only)

A. less than 20%

B. 20 - 39%

C. 40 - 59%

D. 60 - 79%

E. 80% +

Indicate the proportion of your time in class devoted to Literature (i.e. 100%) which is given to each of the following.

6. Poetry

A. 0

B. 1 - 20

C. 21 - 40

D. 41 - 60

E. 61 or more

7. Drama

A. 0

B. 1 - 20

C. 21 - 40

D. 41 - 60

E. 61 or more

8. Prose Fiction

A. 0

B. 1 - 20

C. 21 - 40

D. 41 - 60

E. 61 or more

9. Prose non-fiction (essay, biography, and belles lettres)

A. 0

B. 1 - 20

C. 21 - 40

D. 41 - 60

E. 61 or more

10. Mass Media (Movies, television)

A. 0

B. 1 - 20

C. 21 - 40

D. 41 - 60

E. 61 or more

11. Indicate which of the following types of books is most frequently used in your literature classes. (indicate one)

    A. One large anthology

    B. Several small anthologies

    C. Individual editions for each work or author

    D. Both anthologies and individual editions equally

    E. Impossible to say what is most frequently used

12. Indicate the extent you have to write about literature. (indicate one)

    A. one or more papers per week

    B. one paper every two weeks

    C. one paper every month

    D. one or two papers during the school year

    E. none

13. Indicate the extent you have to read literature aloud, either singly or in groups.

    A. rarely or never

    B. occasionally

    C. frequently

14. Indicate the extent you have to recite passages of literature from memory.

    A. rarely or never

    B. occasionally

    C. frequently

15. Indicate whether or not you take part in amateur dramatics or school dramatics in any way?

    A. Yes

    B. No

In your study of literature in general, you are asked to consider different kinds of questions. Some of them are more important to your understanding of literature than others. Read the list of questions below and indicate the five that you think are most important to your understanding of the literary works in general.

16. Is there any one part of the story that explains the whole

17. What does the story tell us about people I know?

18. What metaphors (or comparisons), images (or references) to things outside the story) or other writer's devices are used in the story?

19. Is there anything in the story that has a hidden meaning?

20. How is the way of telling the story related to what it is about?

21. Is the story well written?

22. What type of story is this? Is it like any other story I know?

23. Are any of the characters in the story like people I know?

24. What happens in the story?

25. Does the story tell me anything about people or ideas in general?

26. Is the story about important things? Is it a trivial or a serious work?

27. Has the writer used words or sentences differently from the way people usually write?

28. How can we explain the way people behave in the story?

29. How does the story build up? How is it organized?

30. Is there a lesson to be learned from the story?

31. Is this a proper subject for a story?

32. When was the story written? What is the historical background of the story and the writer?

33. Does the story succeed in getting me involved in the situation?

34. What emotions does the story arouse in me?

35. What is the writer's opinion of, or attitude toward the people in the story?

IEA/TQ 1
IEA/TQ 2
IEA/TQ 3
IEA/TQ 4

TEACHER QUESTIONNAIRES

ACCOMPANYING NOTES

TEACHER QUESTIONNAIRE

General Section

Q. 5 This is full-time training and such phenomena as 'Referendarzeit' in Germany should be included.

Q. 8 This question may well have to be asked in different ways according to the national context. The aim is to assess the amount of in-service training received in the last five years. Where teachers attend evening courses or a two day course, these should be totalled. 6 hours = 1 day and 5 days = 1 week. Please round to the nearest week.

Q. 13 By general teachers' association or union is meant either regional or national association e.g., National Education Association, American Federation of Teachers, N.U.T. etc.

Q. 14 Examples of teachers' subject matter association are: National Council of Teachers of English, Modern Languages Association etc.

Q. 38 This should be treated as an unscaled variable. National Centers should develop a set of up to nine categories which will cover the range of possible circumstances in their country. The categories should be arranged in order of their position in the academic hierarch (if possible).

Category A will be "I have received no training at all".

Categories B, C and D should be used for institutions which do not give degrees.

Categories E and F should be used for institutions giving first degrees but not allowing for graduate study.

Categories G, H and I should be reserved for university type institutions.

See the General Notes for further explanation of unscaled variables.

Science

Q. 1 - 5 If the word "semester" is not used, replace with "year" or "term" whichever is appropriate. However, the question should be asked in such a way that the international coding can be used on the answer card. Where, for example, in physics both a laboratory and lecture class have been taken in a semester, this is one semester.

Q. 6 - 10 This may be rephrased into hours or days in some countries where appropriate, but must be coded in terms of the international code.

Q. 11 This is a new question evolved from responses obtained from the open-ended questions in the pre-testing.

Q. 21 This should be treated as an unscaled variable. National Centers should develop a set of up to nine categories which will cover the range of possible circumstances in their country. The categories should be arranged in order of their position in the academic hierarch (if possible).

Category A will be "I have received no training at all".

Categories B, C and D should be used for institutions which do not give degrees.

Categories E and F should be used for institutions giving first degrees but not allowing for graduate study.

Categories G, H and I should be reserved for university type institutions.

See the General Notes for further explanation of unscaled variable.

Reading Comprehension

This questionnaire is to be given only to those teachers within a school who are teaching the skills of reading, at whatever level.

Literature

A Literature teacher is anyone teaching Literature in the Mother Tongue.

Q. 3 - 6 These may be rephrased into hours or days in some countries where appropriate, but code in terms of the international code.
(6 hours = 1 day; 5 days = 1 week)

Q. 38 This is an unscaled variable. National Centers should develop a set of up to nine categories which will cover the range of possible circumstances in their country. The categories should be arranged in order of their position in the academic hierarch (if possible).

Category A will be "I have received no training at all".
Categories B, C and D should be used for institutions which do not give degrees.
Categories E and F should be used for institutions giving first degrees but not allowing for graduate study.
Categories G, H and I should be reserved for university type institutions.

See the General Notes for further explanation of unscaled variables.

TEACHER QUESTIONNAIRE

GENERAL SECTION

1. Sex (indicate one)

   A. Male

   B. Female

2. Age (indicate one of the following)

   A. 18 - 27

   B. 28 - 37

   C. 38 - 47

   D. 48 - 57

   E. 58 or more

3. Indicate whether you are by training a specialist teacher in any particular subject(s).

   A. Yes

   B. No

4. If yes, are you now teaching

   A. Your special subject only

   B. Your special subject and one or two other subjects

   C. Only subject(s) other than those for which you were trained to teach

5. If no, are you teaching

   A. A single subject

   B. Two or three subjects

   C. Most of the subjects in the curriculum

6. Indicate how many years of full-time education (primary and secondary only) you have had.

   A. < 6 B. $> 6 \leq 8$ C. $> 8 \leq 10$

   D. $> 10 \leq 12$ E. > 12

/

7. Indicate how many years of full-time education you have had beyond secondary school (excluding part-repetition of courses).

A. 0 years B. $> 0 \le 2$ C. $> 2 \le 3$

D. $> 3 \le 4$ E. > 4

8. Indicate how many weeks (full-time equivalent) in-service teacher training you have received during the last 5 years.

A. 0 weeks B. $> 0 \le 2$ weeks C. $> 2 \le 4$

D. $> 4 \le 9$ E. > 9

9. Indicate how many years, including the present year, you have been teaching altogether.

A. ≤ 5 years B. $> 5 \le 10$ years C. $> 10 \le 20$ years

D. $> 20 \le 30$ years E. > 30 years

10. Indicate how many years, including the present year, you have been teaching altogether in this school.

A. ≤ 5 years B. $> 5 \le 10$ years C. $> 10 \le 20$ years

D. $> 20 \le 30$ years E. > 30 years

11. Indicate how many hours a week you spend in preparing lessons.

A. ≤ 3 hours B. $> 3 \le 6$ hours C. $> 6 \le 10$ hours

D. $> 10 \le 15$ hours E. > 15 hours

12. Indicate how many hours a week you spend on marking papers and examinations.

A. ≤ 3 hours B. $> 3 \le 6$ hours C. $> 6 \le 10$ hours

D. $> 10 \le 15$ hours E. > 15 hours

13. Indicate if you are a member of a general teachers' association or union? (indicate one)

A. Yes

B. No

14. Indicate if you are a member of a subject matter teaching association?

A. Yes

B. No

15. Indicate how often you read a periodical(s) or journal(s) about teaching?

A. Regularly

B. Occasionally

C. Rarely

16. Indicate how often you read a periodical(s) or journal(s) on a subject related to your teaching field?

A. Regularly

B. Occasionally

C. Rarely

17. During the last year, indicate if you have attended any conferences in education in an area related to your teaching field?

A. Yes

B. No

In assessing your students' work, please indicate how often you use each of the following types of appraisal. (Indicate one response for each type.)

	A. Frequently	B. Occasionally	C. Rarely or Never
18. Standardized tests	A.	B.	C.
19. Teacher-made essay tests	A.	B.	C.
20. Teacher-made objective tests	A.	B.	C.
21. Performance on homework	A.	B.	C.
22. Performance on projects, term paper, etc.	A.	B.	C.

Indicate the importance of each of the following in determining what you teach on a day-to-day basis. (Indicate one for each practice listed)

		A. Very Important	B. Of Some Importance	C. Of Little Importance
23.	What I think the students in my class will need when they leave school	A.	B.	C.
24.	The official curriculum or syllabus	A.	B.	C.
25.	Prescribed textbook(s)	A.	B.	C.
26.	The external examinations that the student will have to take	A.	B.	C.
27.	What the students will need at the next grade or the next course in this subject	A.	B.	C.

Indicate how often you use each of the following in your instruction. (indicate one answer for each kind)

	A. Often	B. Sometimes	C. Rarely or Never
28. Textbooks	A.	B.	C.
29. Printed drill material	A.	B.	C.
30. Individualized material (e.g. Programmed instruction)	A.	B.	C.
31. Small group work	A.	B.	C.
32. Individual tutoring or individual conferences for students	A.	B.	C.
33. Audio-visual materials – TV, films, slides, radio, etc.	A.	B.	C.
34. Field trips and special projects	A.	B.	C.
35. Lectures	A.	B.	C.
36. Questioning	A.	B.	C.
37. Discussion	A.	B.	C.

38. In which one of the following types of institutions did you receive the greatest amount of post-secondary school education (including teacher training)?

National Center - Unscaled Variable - See Notes.

IEA/TQ2

TEACHER QUESTIONNAIRE

SCIENCE

Indicate how many semesters of full-time training you have completed at a post-secondary school institution. (Note: a full academic year is here counted as equivalent to two semesters.)

1. In Physics:

A. 0 Semesters B. ≤ 2 C. $> 2 \leq 4$
D. $> 4 \leq 6$ E. > 6

2. In Chemistry:

A. 0 Semesters B. ≤ 2 C. $> 2 \leq 4$
D. $> 4 \leq 6$ E. > 6

3. In Biology (including Botany and Zoology):

A. 0 Semesters B. ≤ 2 C. $> 2 \leq 4$
D. $> 4 \leq 6$ E. > 6

4. In Geology:

A. 0 Semesters B. ≤ 2 C. $> 2 \leq 4$
D. $> 4 \leq 6$ E. > 6

5. In other Physical and Natural Sciences:

A. 0 Semesters B. ≤ 2 C. $> 2 \leq 4$
D. $> 4 \leq 6$ E. > 6

Indicate how many weeks (full-time equivalent) in-service teacher training you have received during the last 5 years.

6. In Physics:

A. 0 weeks B. $> 0 \leq 2$ weeks C. $> 2 \leq 4$ weeks
D. $> 4 \leq 9$ weeks E. > 9 weeks

7. In Chemistry:

A. 0 weeks B. $> 0 \leq 2$ weeks C. $> 2 \leq 4$ weeks
D. $> 4 \leq 9$ weeks E. > 9 weeks

Indicate how many weeks of full-time in-service training you have received during the last five years

8. In Biology (including Botany and Zoology):

A. 0 weeks B. $> 0 \leq 2$ weeks C. $> 2 \leq 4$ weeks

D. $> 4 \leq 9$ weeks E. > 9 weeks

9. In Geology:

A. 0 weeks B. $> 0 \leq 2$ weeks C. $> 2 \leq 4$ weeks

D. $> 4 \leq 9$ weeks E. > 9 weeks

10. In other Physical or Natural Sciences:

A. 0 weeks B. $> 0 \leq 2$ weeks C. $> 2 \leq 4$ weeks

D. $> 4 \leq 9$ weeks E. > 9 weeks

11. If you have received any in-service training during the last five years, please indicate when you have received most of this in-service training.

A. Course(s) during vacation time

B. Course(s) out of school hours during school term

C. Course(s) in school hours during school term

12. Indicate to what extent you attempt to make the students' practical experience the basis of their scientific knowledge.

A. As much as possible, and I make a considerable effort to this end.

B. I think it important, but other sources of information are equally important.

C. Only a small amount of the students' scientific knowledge can be based upon their practical experience.

13. Indicate how often you give your Science students opportunities for planning and carrying out limited scientific investigations on their own.

A. At least once a week B. About once a month

C. Over once a term or less frequently D. Never

9

Indicate how many hours per week you spend, on the average, in the preparation of all your Science lessons, in marking students' Science work and in reading to keep up with your subject matter.

14. During school hours:

A. ≤ 3 hours   B. >3 ≤6 hours   C. > 6≤10 hours

D. > 10≤15 hours   E. >15 hours

15. Outside school hours

A. ≤ 5 hours   B. > 5≤10 hours   C. > 10≤15 hours

D. > 15≤20 hours   E. > 20 hours

16. Do you feel the need for refresher courses in Science?

A. Yes

B. No

If "yes" is this because you (see Q. 17 - 19)

17. now have teaching commitments which are outside of your initial training area.

A. Yes

B. No

18. feel the need to keep up with major new developments in Science itself.

A. Yes

B. No

19. feel the need to keep up with major new developments in Science teaching methods.

A. Yes

B. No

20. Indicate if you have all the opportunities you need for refresher (in-service) training.

A. Yes

B. No

21. Indicate in which type of institutution you received most of your specialist training referred to in Ques. 1 - 5.

National Center - Unscaled Variable

TEACHER QUESTIONNAIRE

READING COMPREHENSION

1. Indicate whether you

   A. Teach the skills of reading only

   B. Teach reading as part of instruction in Mother Tongue

   C. Teach reading only incidently during regular teaching

2. Indicate how many hours of instruction you have had on methods of teaching reading.

   A. None

   B. 1 - 10 hours

   C. 11 or more hours

3. Indicate if you have attended any course or seminar specifically devoted to the teaching of reading, since you began teaching.

   A. Yes

   B. No

4. Indicate if there is available any specialist service (e.g., a child guidance clinic or a school psychological service) to whom you can refer a child who has reading difficulties.

   A. Yes

   B. No

5. Indicate if there is any teacher in your school who deals specially with children who have reading problems.

   A. Yes

   B. No

6. Within the last twelve months, indicate if you have referred any children to a special teacher or to any other specialist for help in reading.

   A. Yes

   B. No

7. Indicate if you use any system of self-organized learning, e.g., a programmed reading scheme or a system of self-checking or mutual checking of reading by students through books, machines or game material, for your teaching of reading.

   A. Yes

   B. No

8. If so, indicate if this system involves

   A. Books

   B. Teaching Machine

   C. Both

9. Indicate if a standardized reading test (i.e., one which refers children's marks to national or regional norms) has been given to all children in your class during the last twelve months.

   A. Yes

   B. No

10. Indicate if you give any individual instruction in reading to children in your class.

    A. Yes

    B. No

11. Indicate if you divide the class into groups for reading periods.

    A. Yes

    B. No

12. Indicate whether you have any periods in which children are allowed to spend time reading materials of their own choice.

    A. Yes

    B. No

    In your teaching of reading indicate whether you

13. Often ask groups of children to read aloud

    A. Yes

    B. No

(In your teaching of reading indicate whether you)

14. Often read aloud to the children with the children just listening

A. Yes

B. No

15. Often read aloud with the children following silently in their own texts

A. Yes

B. No

16. Indicate whether you include any special training in your reading program to improve the student's rate of reading.

A. Yes

B. No

17. Indicate whether the reading textbook or work-book you use provide for improvement of reading comprehension by setting comprehension questions other than questions on vocabulary.

A. Yes

B. No

18. Indicate how your children obtain reading textbooks.

A. Buy their own

B. Loaned to them

C. Do not have one

19. Indicate whether each child in the class has a dictionary exclusively for himself.

A. Yes

B. No

20. Indicate whether there is a class library or a bookcorner in your classroom.

A. Yes

B. No

21. If yes, indicate how many books there are in the class library or corner.

A. ≤ 10 B. $> 10 \leq 20$ C. $> 20 \leq 50$

D. $> 50 \leq 100$ E. > 100

22. If yes, indicate how many books have been added in the last year.

A. ≤ 10 B. $> 10 \leq 20$ C. $> 20 \leq 30$

D. $> 30 \leq 40$ E. > 40

23. Indicate how the reading textbook(s) used in your classroom was chosen.

A. None used B. By you C. By your local colleagues

D. By local or central school officials

IEA/TQ4

TEACHER QUESTIONNAIRE

LITERATURE

Indicate how many weeks (full-time equivalent) in-service teacher training you have received during the last 5 years.

1. In Literature:

A. 0 weeks B. > 0 ≤ 2 weeks C. > 2 ≤ 4 weeks
D. > 4 ≤ 9 weeks E. > 9 weeks

2. In Linguistics:

A. 0 weeks B. > 0 ≤ 2 weeks C. > 2 ≤ 4 weeks
D. > 4 ≤ 9 weeks E. > 9 weeks

3. In Philology:

A. 0 weeks B. > 0 ≤ 2 weeks C. > 2 ≤ 4 weeks
D. > 4 ≤ 9 weeks E. > 9 weeks

4. In other areas of humanities:

A. 0 weeks B. > 0 ≤ 2 weeks C. > 2 ≤ 4 weeks
D. > 4 ≤ 9 weeks E. > 9 weeks

Indicate if any, which of the following kinds of books you require or recommend to your students.

5. Histories of Literature:

A. Require

B. Recommend

C. Neither

6. Handbooks of literary criticism:

A. Require

B. Recommend

C. Neither

7. Biographies of individual authors:

   A. Require

   B. Recommend

   C. Neither

8. Critical essays on individual authors or works:

   A. Require

   B. Recommend

   C. Neither

9. Indicate how much teaching time do you devote to modern literature (written after World War I) as opposed to earlier literature in general.

   A. Time is devoted primarily to modern literature

   B. Time is devoted about equally between earlier and modern literature

   C. Time is devoted primarily to earlier literature

10. Do you advocate that your students should (indicate one)

   A. Read only those books which can be discussed in depth in class.

   B. Read as many books as possible.

Indicate which of the following you think is closest to your aim as you teach Literature.

11.. Literary instruction should seek to

   A. encourage the students' personal development through their talk about Literature.

   B. enable the students to comprehend the complexity and beauty of individual literary works.

   C. show the students that their heritage is best preserved through great writers and their works.

We have interviewed numerous teachers of Literature and have asked them what questions they have found it most profitable or most important to ask in class discussions or in writing assignments. The questions, of course, differed greatly, but we found that they fell into certain groups. Below are the groups we have found. They are in general terms and would have to be modified for specified works of Literature. Please rate each of the following questions from A (trivial) to D (very important) to indicate the degree to which you think each question is important to the aims of your course in Literature.

A = trivial   B = little importance   C = some importance

D = very important

12. Is it proper for an author to write a story about such a subject?

A B C D

13. What literary devices (metaphors, images, allusions, rhetorical devices, or other devices like dialogue or description) did you notice in the work?

A B C D

14. Is the work symbolic or allegorical? What is its theme?

A B C D

15. How would you describe the language (grammar, syntax, versification or diction) of this work?

A B C D

16. How is the work related to the time in which it was written (politically, philosophically, biographically)?

A B C D

17. What happens in the work? Who is narrating it? What is the setting?

A B C D

18. How is the technique (the form, language, or structure) related to what the work says?

A B C D

19. What is the structure of the work? How is it organized?

A B C D

20. Is the work well written? Does the form support the content? Is it well constructed?

A B C D

A = trivial B = little importance C = some importance

D = very important

21. How would you interpret the character of this person? What is the significance of the setting?

A B C D

22. Did you find that any of these people are like people you know? Did anything like this happen to you?

A B C D

23. Do any of the formal devices (sound, structure, syntax) have any significance? What symbols do you find in the work?

A B C D

24. What is the genre of the work? In what literary tradition is it?

A B C D

25. Does this work describe the world as it is? Do you find the world like the way it is described in this work?

A B C D

26. What is the author teaching us? What is the work criticizing?

A B C D

27. What is the tone (effect, mood, attitude, or point-of-view) in the work?

A B C D

28. Indicate which of the following best describes your impression of your students.

A. Most are genuinely and seriously interested in Literature.

B. Most are mainly interested in comics, movies, and television, not in serious Literature.

C. Most are interested in doing well in Literature courses, but not in what they read.

29. Indicate if you post-secondary education was

A. mainly in Literature

B. mainly in some other field

30 - 37 Listed below are a number of goals for the teaching of Literature, frequently mentioned by teachers. Please rank them in the order of importance to you as a teacher. Rank the most important 1, the next 2, and so on. Please assign a rank only once.

A. To improve the literary tastes of students

B. To teach the students the history of their literature

C. To acquaint the students with their literary and cultural heritage

D. To help the students understand themselves and the human condition

E. To develop the students' ability to discuss the variety of literary forms that are around them

F. To develop the critical faculties and analytic skills of the students

G. To develop the students' ability to use their language

H. To show the students the ways by which language affects their response to events

30. Indicate your first choice:

A B C D E F G H

31. Indicate your second choice:

A B C D E F G H

32. Indicate your third choice:

A B C D E F G H

33. Indicate your fourth choice:

A B C D E F G H

34. Indicate your fifth choice:

A B C D E F G H

35. Indicate your sixth choice:

A B C D E F G H

36. Indicate your seventh choice:

A B C D E F G H

37. Indicate your eighth choice:

A B C D E F G H

38. Indicate in which type of institution you received most of your post-secondary education training.

National Center - unscaled variable, see General Notes.

SCHOOL QUESTIONNAIRE

SCHOOL QUESTIONNAIRE

Accompanying Notes

Note: Each school will require 3 punched cards A, B, C. Where more than one population is tested in any one school, the cards should be reproduced with the necessary change made in Col. 8 of Card 1.

Q 6 Community or area in which the school is situated.

Q 7 Available in the sense of being able to visit.

Q 9 This question will have to be rephrased according to the national system of education. When punching, 01 will be the first year of school after kindergarten, 02 the second year, etc.

Q 10 Pre-university grade will have to be redefined by National Centers.

Q 14 It is not necessary to punch the Yes or No to this question. It has been put in simply as an extra check so that if the number of students is not filled in (and therefore punched as zero) it really means that there are no laboratories.

Q 18 Amounts to be coded in the national currency. Use the appropriate number of columns and inform the co-ordinator of what you have done. It may be that the National Center will have to have careful estimates made either by themselves or the school principal. Alternatively, the information will have to be collected from the local authority. (Factors x 10 or x 100 can be introduced).

Q 19 It is important that part-time teachers are counted. It is up to National Centers to agree with the participating schools on the equivalence of part-time teachers to one full-time teacher.

Q 21 Laboratory Technician: This may have to be defined in national terms. What is intended is a person (not a student) who can assist with the setting up of experiments and helping with demonstrations in the laboratory.

Q 27 Some schools have a particular emphasis, such as mainly academic or mainly vocational, etc. Other schools provide explicitly all types of course without particular preference or emphasis on any of them. The National Centers may have to rephrase this question in a way appropriate for their particular country, but it must be coded in terms of the international code.

Q 31 This should also include 'parent associations' or similar activities.

SCHOOL QUESTIONNAIRE

(Note - It is assumed that this questionnaire will be completed by the school co-ordinator who may or may not be the school principal.)

The present questionnaire is devised to provide information needed for an international study of six subject areas. Among other things, outcomes of instruction in terms of performance on international achievement tests are related to certain "input" factors such as the facilities of the various school systems in terms of teacher training, number of hours of instruction, physical plant, etc. We are fully aware of the fact that in some instances a question cannot be answered with complete accuracy unless the school co-ordinator carries out time-consuming research. We want, however, to avoid that an undue burden is put on those answering the questionnaire, and therefore, urge that estimates are made in cases when exact figures are not available.

DO NOT WRITE HERE

SCHOOL QUESTIONNAIRE

A/01-02 blank

Country A/03-04 ______

1. Name of School ______________________ A/05-07 ______

Target Population A/08 ______

A/09-11 blank

Personal Data of School Principal

A/12 A

2. Please indicate your formal qualifications. (indicate highest degree received)

Less than Bachelors ______

Bachelor ______

Masters ______ A/13 ______

Doctorate ______

3. How many years have you served as a school principal altogether?

______ years A/14-15 ______

4. How many years have you served as a principal of this school?

______ years A/16-17 ______

5. How many years teaching experience have you had altogether?

______ years A/18-19 ______

Basic School Facts

6. Which of the following best characterizes the community served by your school?

Urban ______

Suburban ______

Mixed urban/rural ______ A/20 ______

Rural ______

DO NOT
WRITE
HERE

7. Which of the following institutions are available to students who attend your school? (Indicate where appropriate)

Museum ________ A/21 ________

Zoo ________ A/22 ________

Public Library ________ A/23 ________

Concert Hall ________ A/24 ________

Opera/Theatre/Ballet ________ A/25 ________

Societies (cultural associations) ________ A/26 ________

8. What is the total enrollment of full-time students in your school?

Boys ________ A/27-30 ________

Girls ________ A/31-34 ________

9. What is the lowest and what is the highest grade in this school?

Lowest ________ A/35-36 ________

Highest ________ A/37-38 ________

10. Approximately how many students are there in the grade

in which most 10 year olds are to be found ________ A/39-42 ________

in which most 14 year olds are to be found ________ A/43-46 ________

which is the pre-university grade ________ A/47-50 ________

DO NOT
WRITE
HERE

11. For each of the following grades, check the one designation which best describes your school.

Grade	Grade does not exist in school	Boys only	Girls only	Boys and Girls mainly taught together	Boys and Girls mainly taught separately
Grade in which most 10-year-olds are to be found					
Grade in which most 14-year-olds are to be found					
Pre-university grade					

A/51 ________

A/52 ________

A/53 ________

12. Does your school have: (indicate one)

Day students only ________ A/54 ________

Some day students and some boarding students ________

Boarding students only ________

DO NOT WRITE HERE

Facilities

13.a Does your school have a school library?

Yes ______ A/55 ______

No ______

13.b If you have a school library, about how many new books were acquired for it during the last year?

Under 10 ______

11 - 50 ______ A/56 ______

51 - 100 ______

over 100 ______

14. If you have science laboratories for each of the following, about how many students can be accommodated in them at one time?

	Have Science Laboratories Yes	Have Science Laboratories No	Number of Students That Can be Accommodated	
Physics	______	______	______	A/57-59 ______
Chemistry	______	______	______	A/60-62 ______
Biology	______	______	______	A/63-65 ______
General	______	______	______	A/66-68 ______

DO NOT
WRITE
HERE

Administration

15. By whom is the real decision made in the following matters: (Indicate one in each row)

	Head of the school	Committee of teachers or faculty	Some local or central authority	
Making Curriculum				A/69 ____
Choosing Textbooks				A/70 ____
Rules and Regulations for Students in the School				A/71 ____
Choosing Teachers				A/72 ____
Conditions of Employment of teachers				A/73 ____
Selection of students for entrance				A/74 ____
Major expenditure of money				A/75 ____
Size of fees				A/76 ____

16.i How frequently do inspectors (superintendents, supervisors, advisors, etc.) visit you school? (Check one)

Never ____

Less than once a year ____

Once a year ____ B/13 ____

Twice a year ____

More than twice a year ____

16.ii If you are visited by inspectors what is the purpose of their visits? (Check where appropriate)

To prepare a report for the authorities ____ B/14 ____

To solve some of the problems of the school ____ B/15 ____

To advise teachers ____ B/16 ____

To assess teachers ____ B/17 ____

DO NOT
WRITE
HERE

17. Are the operating costs for your school: (Check one)

totally provided by the government (local or central) ________

partially provided by the government (local or central) ________ B/18 ________

totally provided by private sources ________

18. Please fill in the following concerning the annual budget for your school.

Teachers salaries	____	B/19-23 ____
Non-teaching staff salaries and wages	____	B/24-28 ____
Maintenance and repair	____	B/29-33 ____
Purchase of equipment (including books, stationary, science supplies, teaching aids,etc)	____	B/34-38 ____
Other (e.g. loan charges)	____	B/39-43 ____

__Staff__

19. How many full-time and full-time equivalent (See Note) teachers are currently employed in your school?

No. of teachers ________ B/44-46 ____

20. What percentage of the teachers (full-time and full-time equivalent) in your school are men?

percent ________ B/47-48 ____

21. Check which of the following persons provide service in your school, even if only on a part-time basis. (Check one in each row)

School Librarian	Yes ________	No ________	B/49 ____
Laboratory Technician	Yes ________	No ________	B/50 ____
School Counselor	Yes ________	No ________	B/51 ____
School Psychologist	Yes ________	No ________	B/52 ____
Reading Specialist	Yes ________	No ________	B/53 ____
Social Worker	Yes ________	No ________	B/54 ____
Teacher Aide	Yes ________	No ________	B/55 ____
Foreign Language Assistant	Yes ________	No ________	B/56 ____

DO NOT
WRITE
HERE

Admission

22. What criteria, other than age, are used for the admission of students to your school? (Check where appropriate)

Residence in area near school ______ B/57 ______

Average grades in previous school or class ______ B/58 ______

Interview ______ B/59 ______

Entrance examination ______ B/60 ______

Graduation from a particular course or School ______ B/61 ______

Membership of a particular group (e.g. religion) ______ B/62 ______

23. Into dividing students into classes for purposes of instruction, schools adopt various practices:

A. In some cases fast learners and slow learners are taught together,

B. In some cases fast learners and slow learners are taught separately,

C. In some cases fast learners and slow learners are taught together for part of the time and are taught separately for part of the time (e.g. for different subjects).

Please state which policy is predominantly followed in your school.

A. ______

B. ______ B/63 ______

C. ______

Note: If you find it difficult to choose one of these alternatives, please indicate why in the remarks section at the end of this questionnaire.

DO NOT
WRITE
HERE

24. Within a classroom teachers sometimes organise students into small groups for purposes of instruction. For each grade given below check the extent to which such within class grouping is practised.

	Grade does not exist	Always or Almost Always	Frequently	Occasionally	Rarely or Never
In the grade in which most 10 year olds are to be found					
In the grade in which most 14 year olds are to be found					
In the pre-university grade					

B/64 ______

B/65 ______

B/66 ______

25. Approximately what percentage of students in the respective grades given below in your school have to repeat. (check in first column if appropriate)

	Grade does not exist in this school	Grade repeaters to nearest percentage
In the grade in which most 10-year-olds are to be found.		
In the grade in which most 14-year-olds are to be found.		
In the pre-university grade		

B/67 ______

B/68 ______

B/69 ______

DO NOT
WRITE
HERE

26. **Approximately what percentage of those students who are not promoted leave school (become drop-outs) without completing the course? (Check in first column if appropriate)**

Grade	Grade does not exist in this school	Percent of those not promoted dropping out before completing the course (to nearest 5%)	
1			C/13 ____
2			C/14 ____
3			C/15 ____
4			C/16 ____
5			C/17 ____
6			C/18 ____
7			C/19 ____
8			C/20 ____
9			C/21 ____
10			C/22 ____
11			C/23 ____
12			C/24 ____
13			C/25 ____
14			C/26 ____

DO NOT
WRITE
HERE

Educational Program

27.a Which of the following statements best characterizes your school's program ?

The school provides a variety of types of courses ____

The school provides only one type of course, (e.g. academic, general, etc.) ____

C/27 ______

27.b If you checked the second alternative in Q.27.a, which type of course is provided:

Academic ______

Vocational/Technical ______

General ______

C/28 ______

28. Do you have any provision for remedial teaching or tutoring in each of the following subject areas? (Check once in each row)

	None	In cases of great need only	Generally available
Mathematics			
Science			
Reading			
English as a foreign language			
French as a foreign language			

C/29 ______
C/30 ______
C/31 ______
C/32 ______
C/33 ______

29. What is the language of instruction for most children in your school ? (Check one)

Mother tongue of children ________

Another language ________

C/34 ______

30. In your school is there student involvement in decision-making concerning disciplinary action? (Check one)

Yes ________

No ________

C/35 ______

DO NOT WRITE HERE

31.a Does your school have a parent-teacher association? (Check one)

Yes ______

No ______ C/36 ______

b If yes, how frequently does it meet? (Check one)

Once a year ______

Twice a year ______

Three to five times a year ______ C/37 ______

Six or more times a year ______

c If yes, in which of the following activities does it engage? (Check where appropriate)

Social work in the community ______ C/38 ______

Socio-cultural activities ______ C/39 ______

Activities for raising money ______ C/40 ______

Providing additional physical amenities (e.g. swimming pool) ______ C/41 ______

Providing new instructional aids (science apparatus, tape-recorders, etc.) ______ C/42 ______

Curriculum and instructional methods (Cooperation over pupils learning problems) ______ C/43 ______

Parent education - providing information for parents about various aspects of the school program ______ C/44 ______

32. Which of the following types of student assessment are used in your school? (Check once in each row)

	Rarely or Never	Sometimes	Frequently	
Oral examinations				C/45 ______
Teacher made essay tests				C/46 ______
Teacher made objective tests				C/47 ______
Standardised tests				C/48 ______
Assessment of practical work				C/49 ______

33. SCIENCE TESTS

The Science tests being administered to the students in your school are internationl - that is to say, they have been constructed so that they can be given to a variety of schools in many countries. Inevitably this has meant that some questions will be asked that will not have been covered by the students in some schools. It is therefore important for us to know whether or not the topics covered by the questions have in fact been taught to the students taking the tests in your school.

Attached to this questionnaire are copies of the Science tests that are being given to the students in your school together with their appropriate answer cards. For each target population (National Centers to enter definition of target populations here) we would like the teachers who are teaching Science to the appropriate grade group (i.e., the grade in which most of the students of a particular target population are to be found) collectively to decide whether or not the topic covered by each question in the tests is included in the syllabus for that grade group (or preceding grades). It is appreciated that all the students may not have reached a topic. In order that the rating described below for each question is the collective judgment of the appropriate teachers, the school co-ordinator is asked to arrange a meeting (or meetings if more than one target population) of the teachers concerned.

Each question should be read in turn, and a judgment made according to the following scale. The chosen response is to be indicated by the school co-ordinator marking the appropriate space on the answer card provided.

A. All students in the appropriate grade group have covered the topic embodied in this item.

B. More than 75% of the students in the appropriate grade group have covered the topic embodied in this item.

C. Between 25% and 75% of the students in the appropriate grade group have covered the topic embodied in this item.

D. Less than 25% of the students in the appropriate grade group have covered the topic embodied in this item.

E. None of the students in the appropriate grade group have covered the topic embodied in this item.

(Note: The judgment recorded should apply to all students at the appropriate grade and not just those being tested.)

REMARKS

SCHOOL QUESTIONNAIRE

CODING AND PUNCHING SCHEME

Each school will require three cards A,B,C for each population.

Question No.	Variable	Hollerith Card/Col. No.	Punching Code	Details of Code
	Country Number	A/3-4	01	AUSTRALIA
			02	BELGIUM
			03	CHILE
			04	ENGLAND
			05	FED. REP. OF GERMANY
			06	FINLAND
			07	FRANCE
			08	INDIA
			09	IRAN
			10	ISRAEL
			11	ITALY
			12	JAPAN
			13	NETHERLANDS
			14	POLAND
			15	SCOTLAND
			16	SWEDEN
			17	THAILAND
			18	UNITED STATES
			19	NEW ZEALAND
			20	HUNGARY
1	Name of School	A/5-7	001-999	School Number
	Target Population	A/8	1 2 4	Pop. 1 Pop. 2 Pop. 4
		A/9-11		leave blank
	Type of Card	A/12	A	Punch 'A' for School Questionnaire Card A

Question No.	Variable	Hollerith Card/Col. No.	Punching Code	Details of Code
2	Principal's Degree	A/13	1 2 3 4	Less than Bachelors Bachelor Master Doctorate
3	Years as Principal	A/14-15	00-50	Punch no. of years
4	Years as Principal in this school	A/16-17	00-50	Punch no. of years
5	Years teaching experience	A/18-19	00-60	Punch no. of years
6	Type of Community	A/20	1 2 3 4	Urban Suburban Mixed urban/rural Rural
7	Institutions available to community Museum Zoo Public Library Concert Hall Opera/Theatre Ballet Societies	A/21 A/22 A/23 A/24 A/25 A/26	1 2	Checked Not Checked
8	Total Enrolment	A/27-30	0000-9999	Enrolment boys
		A/31-34	0000-9999	Enrolment girls
9	Lowest grade	A/35-36	01-12	Lowest grade
	Highest grade	A/37-38	01-14	Highest grade
10	Students per grade 10 year olds grade	A/39-42	0000-9999	No. of students
	14 year olds grade	A/43-46	0000-9999	No. of students
	pre-university grade	A/47-50	0000-9999	No. of students

Question No.	Variable	Hollerith Card/Col. No.	Punching Code	Details of Code
11	Coeducation 10 year olds grade 14 year olds grade pre-university grade	 A/51 A/52 A/53	0 1 2 3 4	Grade does not exist Boys only Girls only Boys : Girls taught together. Boys : Girls taught separately.
12	Day-Boarding School	A/54	1 2 3	Day students only Some day - some boarding Boarding students only
13 a	Library	A/55	1 2	Yes No
b	New Books last year	A/56	1 2 3 4	Under 10 11 - 50 51 - 100 over 100
14	Science Lab. accommodation Physics Chemistry Biology General	 A/57-59 A/60-62 A/63-65 A/66-68	000-999	Punch no. of students
15	Decision - making Curriculum Choosing Textbooks Rules Choosing Teachers Conditions Std.Selection Fin. Exp. Size of fees	 A/69 A/70 A/71 A/72 A/73 A/74 A/75 A/76	1 2 3	Head of school Committee of Teachers or Faculty Some local or central Authority
	Country no.	B/3-4	01-19	Country no. - see above
	School no.	B/5-7	001-999	School Number
	Target Pop.	B/8	1-4	Target Pop. - see above
		B/9-11		leave blank
	Type of card	B/12	B	Punch 'B' for School Questionnaire Card B

Question No.	Variable	Hollerith Card/Col. No.	Punching Code	Details of Code
16 i	Inspection	B/13	1	Never
			2	Less than once a year
			3	Once a year
			4	Twice a year
			5	More than twice a year
ii	Reasons			
	Report to Authorities	B/14	1	Checked
	Solve School problems	B/15		
	Advise teachers	B/16	2	Not checked
	Assess teachers	B/17		
17	School operating costs	B/18	1	Totally govt.
			2	Partially govt.
			3	Totally provided.
18	School Budget Teacher salaries	B/19-23	00001-99999	Punch in local currency
	Non-teaching staff salaries	B/24-28	00001-99999	Punch in local currency
	Maintenance and repair	B/29-33	00001-99999	Punch in local currency
	Purchase of Equipment	B/34-38	00001-99999	Punch in local currency
	Other (e.g. loan charges)	B/39-43	00001-99999	Punch in local currency
19	Full-time staff	B/44-46	001-999	Punch no. of teachers
20	Percentage - Male/Female	B/47-48	01-99	Punch percent
21	Persons providing Service			
	School Lib.	B/49	1	Yes
	Lab. Tech.	B/50		
	School Counselor	B/51		
	School Psych.	B/52		

Question No.	Variable	Hollerith Card/Col. No.	Punching Code	Details of Code
	Reading Specialist	B/53		
	Social Worker	B/54	2	No
	Teacher Aid	B/55		
	Foreign Lang. Assistant	B/56		
22	Criteria of admission			
	Area near school	B/57	1	Checked
	Previous school	B/58		
	Interview	B/59		
	Entrance exam	B/60		
	Graduation	B/61	2	Not checked
	Membership	B/62		
23	Division of students into classes	B/63	1	Fast and slow together
			2	Fast and slow separately
			3	Sometimes together, sometimes apart
24	Division within classes			
			0	Grade does not exist
	10 year olds	B/64	1	Always
	14 year olds	B/65	2	Frequently
			3	Occasionally
	pre-university	B/66	4	Rarely or never
25	Grade repetition		0	Grade does not exist
			1	0%
	10 year olds	B/67	2	5%
			3	10%
	14 year olds	B/68	4	15%
			5	20%
	pre-university	B/69	6	25%
			7	30%
			8	35% or more

Question No.	Variable	Hollerith Card/Col. No.	Punching Code	Details of Code
	Country	C/3-4	01-19	Country no. - see above
	School No.	C/5-7	001-999	School Number
	Target Pop.	C/8	1-4	Target Pop.
		C/9-11		leave blank
	Type of Card	C/12	C	Punch 'C' for School Questionnaire Card C
26	Percent drop-out			
	Grade 1	C/13	0	Grade does not exist
	Grade 2	C/14	1	0%
	Grade 3	C/15	2	5%
	Grade 4	C/16	3	10%
	Grade 5	C/17	4	15%
	Grade 6	C/18	5	20%
	Grade 7	C/19	6	25%
	Grade 8	C/20	7	30%
	Grade 9	C/21	8	35% or more
	Grade 10	C/22		
	Grade 11	C/23		
	Grade 12	C/24		
	Grade 13	C/25		
	Grade 14	C/26		
27	School program	C/27	1 2	Variety 1 type only
	Type of program	C/28	1 2 3	Academic Vocational General
28	Remedial Teaching			
	Maths	C/29		
	Science	C/30	1	None
	Reading	C/31	2	Great need only
	English as for.Lang.	C/32	3	Generally available
	French as for. lang.	C/33		
29	Language of instruction	C/34	1 2	Mother tongue Another language
30	Discipline	C/35	1 2	Yes No

Question No.	Variable	Hollerith Card/Col. No.	Punching Code	Details of Code
31	Parent-teacher Association	C/36	1 2	Yes No
	Frequency - Meeting	C/37	1 2 3 4	Once a year Twice a year 3-5 times a year 6 or more times a year
	Social work	C/38		
	Socio-cultural activities	C/39		
	Raising money	C/40	1	Checked
	Physical amenities	C/41		
	Instructional aids	C/42		
	Curriculum	C/43	2	Not checked
	Parent educ.	C/44		
32	Oral exams	C/45		
	Teacher essay	C/46		
	Teacher obj. tests	C/47	1	Rarely
	Standardised tests	C/48	2	Sometimes
	Assessment of practical work	C/49	3	Frequently

SECTION 2 (FOR POPULATION IV)

UNDERSTANDING THE NATURE OF SCIENCE

ANSWER CODE

*	1.	B		9.	C
	2.	C	*	10.	A
	3.	C	*	11.	B
*	4.	C		12.	B
	5.	B	*	13.	C
*	6.	E		14.	A
*	7.	D		15.	C
	8.	C			

* Anchor items with Population II

SECTION 2 (FOR POPULATION II)

UNDERSTANDING THE NATURE OF SCIENCE

ANSWER CODE

1.	C
2.	D
3.	E
4.	A
5.	B
6.	A
7.	A
* 8.	B
* 9.	C
* 10.	E
* 11.	D
12.	E
* 13.	A
* 14.	B
* 15.	C

* Anchor item with Population IV

ERRATUM SHEET - WORD KNOWLEDGE, QUESTIONNAIRE, ETC. BULLETIN

(YELLOW BULLETIN)

Word Knowledge Tests: IEA/2F, IEA/6F, and IEA/13F

1. Under directions, change the first paragraph to read as follows: "In this test words are given to you in pairs. You must decide whether the words have nearly the same meaning or nearly the opposite meaning."

2. In IEA/2F the symbol "S" and "O" have been used next to each word pair. These symbols may be translated into any symbols the National Center wishes to use. In Population I, the symbols should remain next to the words as the students will be marking their answers in the booklet.

3. For IEA/6F and IEA/13F direction sheet, the "S" should be changed to "+" and the "O" should remain the same. In the test itself, the "S" and "O" which are placed next to each word pair should be removed since these are located on the answer card.

Science Attitude and Descriptive Scale - Population I IEA/1K

4. The 2nd paragraph of directions should now read as follows: "The answers to these questions should be put in Section K on your answer card. Blacken in the oval which has the letter of the answer you choose for each question. If you wish to change an answer you have given, you may, but be sure to erase the mark for the old answer."

Science Attitude and Descriptive Scale - Population II & Population IV
IEA/5K & IEA/12K

5. Question 23: the stem should be changed to read as follows: "I enjoy watching (listening to) Science Programmes on T.V. (radio)."

6. Question 35: delete the existing item and replace it with the following: "During our Science lessons the amount of time we spend reading our text books is about
   A. 1/4 or less
   B. half
   C. 3/4 or more "

Student Questionnaire - Population I (ST1 - IEA/2G)

7. Question 2 is to be deleted from the Questionnaire. It will be replaced by a box similar to that for Target Population and

Type of Card with "Student Number" inserted inside the box. Thus Questions 1 - 3 will now look as follows:

1. Name of your school ______________ | 05-07 ____
Target Population | 08 1
Student Number | 09-11 ____
Type of Card | 12 J

3. How old are you? ______ years ______ months | 13-15 ____

Note: Test Administrators will have to be asked to make it clear to the students taking the Questionnaire that there is NO Question 2.

Accompanying Notes for Teacher Questionnaires IEA/TQ1 - IEA/TQ4

8. As a general note before the General Section in the Accompanying Notes, the following should be inserted:
"**Population of Teachers to Whom Questionnaires Will Be Given**
Population I

All classroom teachers in selected schools who are teaching students aged 10 - 11 or younger. In large schools a sub-sample of this population of teachers can be taken. All selected teachers should be requested to complete the General Section of the questionnaire; if any are teaching science (in any form) they should be asked to completed the Science section; if any are also specific teachers of reading, they should be asked to complete the Reading Comprehension section.

Population II and IV

All teachers in selected schools who are teaching Science, (and Mother Tongue for countries testing in Reading Comprehension and/or Literature). All selected teachers should be requested to complete the General Section of the questionnaire; in addition, science teachers should be asked to complete the science section and Literature teachers, the literature section. It is not anticipated that there will be any specific teachers of reading - if there are, (e.g. remedial teachers) they should be asked to complete the Reading Comprehension Section."

Teacher Questionnaire (General) IEA/TQ1

9. Insert the following directions on the cover sheet or at the beginning of the Questionnaire: "Please record the answers to the following questions in the appropriate place in section AA on the answer card. The responses should be made by blackening

the chosen response position with an ordinary pencil. Please give only one response to each question and erase all stray marks."

Teacher Questionnaire (Science) IEA/TQ2

10. Insert the following directions on the cover sheet or at the beginning of the Questionnaire: "The answers to these questions should be recorded in section BB of the enclosed answer card. Do not answer these questions if you do not teach Science."

Teacher Questionnaire (Reading Comprehension) IEA/TQ3

11. Insert the following directions on the cover sheet or at the beginning of the Questionnaire: "The answers to these questions should be recorded in section CC of the enclosed answer card. Do not answer these questions if you do not teach Mother Tongue."

Teacher Questionnaire (Literature) IEA/TQ4

12. Insert the following directions on the cover sheet or at the beginning of the Questionnaire: "The answers to these questions should be recorded in section DD of the enclosed answer card. Do not answer these questions if you do not teach Literature."

School Questionnaire IEA/SQ1

13. Question 33, page 13 : in each of the five responses delete "topic" and insert "process" (see Manual 2, paragraph 12 on this point.)

School Questionnaire Coding and Punching Scheme

14. Page 7 - add the following to the bottom of the Coding and Punching Scheme:

	School Sampling Stratum Number	C/50-51	01-50	Actual Stratum Number

General Notes :

15. In every case where directions appear in the Bulletin, a check should be made against Manual 3 where the Testing Administrator reads out the instructions. Where necessary, the directions in the Bulletin should be changed to agree with what is said in Manual 3.

16. In some of the Yellow Bulletins, the pages have been inserted backwards in some sections. For example in some Bulletins from Student Questionnaire ST 2 (IEA/5S & IEA/12S) through Teacher Questionnaire (Science) (IEA/TQ2), page 2, the pages have been reversed. Please check that when you prepare your own Bulletins the pages appear in the correct order.

17. You will notice that Sections IEA/2H, IEA/6H & IEA/13H are not included in the Yellow Bulletin; these will be sent to you as soon as possible.

ERRATUM SHEET NO. 2 (YELLOW)

Accompanying Notes ST 2

As a result of queries from some National Centers it is clear that we have not given sufficient information on the post-coding of Question G and Question P on ST 2 General Section.

Question G - Grade in School

The answer card has 10 positions, marked 3 - 12. These should be coded as follows:-

Populations I and II : mark on the answer card the actual grade.

Populations III and IV : mark on the answer card the grade number minus 2. Thus, grade 12 will be marked 10, grade 13 will be marked 11, grade 14 will be marked 12.

Question P - Program

The last sentence in the present accompanying notes for Question P should be deleted.

The categories established by National Centers should be arranged such that the highest category is 9 and the lowest category 1. If convenient, the following categorisation might be used by National Centers, but it is up to National Centers to decide on their own categories:

7 - 9	Academic
4 - 6	Vocational
1 - 3	General
0	should be used as an "unclassified" category

National Centers are requested to send their categories to the Coordinating Center.

INFORMATION
on the
INTERNATIONAL ASSOCIATION
for the
EVALUATION OF EDUCATIONAL ACHIEVEMENT
(IEA)

1968

c/o UNESCO INSTITUTE FOR EDUCATION, HAMBURG

Introduction

I.E.A. is an international, non-profit-making scientific association, the principal aims of which are:

(a) to undertake educational research on an international scale;
(b) to promote research aimed at examining educational problems common to many countries, in order to provide facts which can help in the ultimate improvement of educational systems;
(c) to provide, within the framework of the Association, the means whereby research centers, which are members of the Association, can undertake cooperative projects.

The seat of the Association is in Liège, Belgium. Membership of the Association is restricted to institutions carrying out research in education. Any such research center, which has the status of a body corporate is eligible for membership, provided it is sufficiently qualified to undertake the research required. There is one institution which is responsible for the work in a particular country, but it may co-operate with other institutions in that country.

The Council of I.E.A., which is the governing body of I.E.A., consists of one representative from the research institution of each country. The Council meets approximately once a year and is responsible for the overall policy of I.E.A.'s research work. It, in turn, elects a Standing Committee of seven of its members, whose function is to guide the activities of the research on its behalf. For the day-to-day operation of the projects, the Standing Committee elects a Bureau, consisting of three members.

As of January 1969, there are nineteen countries in I.E.A. The present project - Phase II - involves work in six subject areas; Science, Reading Comprehension, Literature, English as a Foreign Language, French as a Foreign Language, and Civic Education, and in each of these subjects an international committee of experts has been formed which coordinates the work of the National Subject Area Committees established within each participating country. I.E.A. has a small central staff. It also has a number of consultants. Furthermore, within each country, each participating center has appointed a Technical Officer to be responsible for the day-to-day work of the project.

All this adds up to a very large number of people engaged in one way or another in this present study. While meetings of individual groups - Council, Subject Committees, National Technical Officers - are held from time to time, there is never an opportunity for every person involved in I.E.A. to meet every one else, nor, do all those from one country know as much as they would like about the people and institutions from others.

This brochure, produced at the request of the I.E.A. Council, is meant to remedy this defect. In its various sections, it lists the names, and in many instances some biographical details of all those many people, who, part time or full time, participate in I.E.A. activities. Some details are also given of the Research Centers belonging to I.E.A.

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IEA INTERNATIONAL

IEA COUNCIL MEMBERS

Those marked with an asterisk (*) are also either Members of the IEA Bureau or Standing Committee.

AUSTRALIA

William C. Radford

Born 1913. M.A. and Ed.M. at the University of Melborne. Ph.D. at the University of London, 1954. Director of the Australian Council for Educational Research since 1955. Member of Boyer Committee of Inquiry into Recruitment into the Public Service of the Commonwealth of Australia, and of Committees of Inquiry in Victoria into State Education, and into the Future Development of Tertiary Education. Leader of UNESCO planning mission to Northern Rhodesia, 1963. Interests are sociology of education, comparative education, objectives and evaluation of educational achievement.

BELGIUM

Gilbert L. de Landsheere*

Born 1921. Licencié en Philosophie et Lettres, agrégé E.S. and Ed.D. at the University of Liège, Belgium. Head of the Department of Educational Research, School of Psychology and Educational Sciences, University of Liège. Long experience in teacher training. Member of numerous national and international commissions. Visiting Professor at the Boston University, and at the State University of the Congo Republic. Fellow of several learned Societies. Author of three books on educational research and of about 100 general and research articles on education.

CHILE

Erika Grassau Schaufele

B.A. in Mathematics and Physics; 1937, M.A. Mathematics and Physics (Minor in Psychology), 1943. M.A. in Statistics, 1947. Director of the Institute of Statistical Research, University of Chile, Professor of Educational Statistics, Faculty of Philosophy and Education, University of Chile. Several publications about Statistical aspects of Chilean Education. Analyses of University Entrance Examinations and Educational Measurement Problems. Proposed Entrance Examination Procedures which are used in Chile since 1966. Editor of publications on Statistics, acted as consultant on Evaluation and Problems on Educational Statistics.

ENGLAND

Douglas Pidgeon*

Born 1919. B.Sc. in Psychology, University of London,

1949. Taught in special schools for handicapped children before joining staff of the National Foundation for Educational Research in England and Wales in 1950. Became Head of the Foundation's Test Services in 1954. Visiting Lecturer, Teachers College, Columbia, 1962/3. Appointed Deputy Director of the N.F.E.R. in 1963. Fellow, British Psychological Society, member American Educational Research Association. Has published many articles on measurement and evaluation and is the co-author of several books on these and other related subjects.

FEDERAL REPUBLIC OF GERMANY

Walter Schultze

Born 1903. Dr.phil., Hamburg University. Research Professor and Head of the Deutsches Institut für Internationale Pädagogische Forschung. Honorary Professor, University of Frankfurt. Secretary General of the International Association for the Advancement of Educational Research. Co-editor of Paedagogica Europaea.

FINLAND

Martti Takala*

Born 1924. Ph.D. at the University of Helsinki, Finland. Professor of Psychology, University of Jyväskylä since 1954. Director, Center for Educational Research, University of Jyväskylä, 1963-7. Director of the Department of Higher Education and Research Ministry of Education, Helsinki, 1967 - 70. Chairman and member of several committees for the development of higher education in Finland. Member of the Assembly of the International Union of Psychological Science. The author of two textbooks and eight research monographs on the psychology of personality and developmental psychology, and about 40 research articles, on experimental study of motivation, expression, psychomotor behavior and drug effects on ability and attitudes development and on parental attitudes.

FRANCE

Maurice Reuchlin

Born 1920. Dr. at the Sorbonne Paris. Professor at the University of Caen, since 1966. Director of L'Institut National d'Etude du Travail et d'Orientation Professionelle and Director of Laboratoire de Psychologie différentielle de l'Ecole Pratique des Hautes Etudes. Member of the Council of La Société francaise de Psychologie. Author of four books and articles on the history of psychology, factor analysis, methodology in psychology. differential psychology, school and vocational guidance.

INDIA

Shib Kumar Mitra

Born 1921. M.A. Patna University, 1943. Ph.D., University of Chicago, 1954. Joint Director, National Council for Educational Research and Training, New Delhi. Vice President, Indian Psychological Association, Delhi Branch, and Indian Association for Programmed Learning. General Editor of the Indian National Review. Member of Sigma Xi USA, Indian Science Congress Association and Indian Psychoanalytical Society. Author of 30 papers on psychometrics and clinical psychology.

IRAN

Iraj Ayman

Born 1928. Ph. D., University of Southern California, in Psychology and Public Administration. Postgraduate studies in Psychology and Education, University of Edinburgh, Scotland, and Management Psychology, Havard University, USA. Professor of Psychology, Head of Department of Psychology, and Director of the Institute for Educational Research and Studies, National Teachers College, Iran, since 1959. Has held various positions, including those of lecturer, consultant, Professor and Research Associate in the Philippines, Scotland and Iran. Holds various honorary positions in research groups and committees. Author of many books on educational and vocational guidance, management development, programmed instruction, Psychology, etc. and about 20 tests.

ITALY

Luigi Meschieri

Born 1919. M.D., University of Rome, 1941. Ph.D. in Psychology 1951. Full Professor of Psychology 1960, and Dean of Faculty of Education, University of Urbino. Formerly Professor of Social Psychology, University of Trento. Research Psychologist, and Director of the Institute of Psychology, National Research Council. Consultant of the Italian National Security Agency, Italian Radio and Television, Educational Centers of the Ministry of Education. Vice President of the Italian Psychological Association. U.N.O. Fellow for study of Social Services in France 1950. Fulbright Visiting Professor in USA, 1955. Author of more than 100 publications, mostly articles dealing with research in Social Psychology, Applied Psychology to Industry and Education.

together with:

Aldo Visalberghi

Born 1919. Degrees in Philosophy and Education, University of Pisa, 1941. Full Professor of Education in the Faculty of Literary and Philosophy studies, University of Rome. Formerly Professor of Education in the State University of Milan and of History of Education, University of Turin. Director of CEPAS (Center for Professional Education of Social Workers) attached to the University of Rome. Fulbright Fellow in USA 1952-53. Author of ten volumes of Education and of about 100 papers.

JAPAN

Masunori Hiratsuka*

Born 1907. Graduated from Tokyo Imperial University in 1932. Professor of Hiroshima Higher Normal College in 1939. Professor of Kyushu Imperial University in 1944. Dean of the Faculty of Education in Kyushu University in 1951. Director of the Institute of Comparative Education and Culture at Kyushu University in 1954. Director of Department of Education at the UNESCO Headquarters in Paris in 1960. Director General of the National Institute for Educational Research in 1963. Professor Emeritus of Kyushu University in 1964. Chairman of the Comparative Education Association in Japan, Member of the Central Advisory Council on Education and the Advisory Council on School Curriculum both in the Ministry of Education. Member of the Japanese National Commission for UNESCO. Board member of the UNESCO Institute for Education in Hamburg. Consultant of the Advisory Committee on UNESCO's Educational Programme in Asia.

NETHERLANDS

Seis Wiegersma

Born 1919. B.Sc. in Science and Ph.D. in Psychology. Engaged in the practice of psychology, especially in personnel selection, school psychology and vocational guidance, from 1946-1953. Research Fellow at the Netherlands Institute for Preventive Medicine at Leyden, mainly working on problems of educational and vocational psychology, 1953-63. Professor of vocational and occupational psychology at the University of Amsterdam, where he is at present prorector, since 1964. The author of six books and a great number of articles dealing with problems in the fields of tests and test theory; interests: school psychology, educational and vocational guidance, vocational psychology, occupational classification and information, personnel selection.

POLAND

Wincenty Okoń

Born 1914. Ph.D. at the University of Lodz, Poland. Ordinary Professor and Head of the Department of Experimental Education, University of Warsaw. Director of the Central Institute for Educational Research at the Ministry of Education. Visiting Research Professor in the USA and Great Britain, 1960. The author of many books on educational subjects.

SCOTLAND

David A. Walker*

Born 1905. M.A. 1927, BEd (now MEd) 1930, Ph.D. 1937, all at the University of Edinburgh. Taught in secondary school for 11 years, and was engaged in educational administration for 17 years prior to becoming Director of the Scottish Council for Research in Education in 1958. Publications include articles in the British Journals of Psychology, Educational Psychology and Statistical Psychology, and joint authorship of a book on the scaling of teachers' marks and estimates. He contributed to Educational Achievements of 13-year-olds in 12 countries, and was an Associate Editor of International Study of Achievement in Mathematics.

SWEDEN

Torsten Husén*

Born 1916. Ph.D. at the University of Lund, Sweden. Research professor and Head, Institute for Educational Research, School of Education, University of Stockholm. Chairman of the Educational Expert Group of the Scandinavian Cultural Commission and the National Security Council; consultant at the Ministry of Education in connection with the Swedish School Reform; Fellow at the Center for Advanced Studies in the Bahaviorial Sciences, Palo Alto, 1965-66; Visiting Research Professor at the College of Education, University of Hawaii, 1968. The author of some 40 books, mostly research monographs. Has written on adolescence, ability and environment, the differentiation problem in the comprehensive school, studies on the content of curriculum in mathematics, physics, chemistry and civics, twin research, etc.

THAILAND

Lamaimas Saradatta

Born 1916. Ed.D. at Teachers College, Columbia University, USA. Professor of Education and Head of the Educational Research Department, College of Education, Bangkok. Director of Bangkok Institute for Child Study. Member, National Research Council of Thailand 1967-69., National Youth Studies Board, Thailand, since 1963, Committee on School Education, National Educational Council of Thailand, since 1968, Committee on the Coordination of Graduate Studies, National Education Council of Thailand, since 1968. Alternate member of the Governing Board of UNESCO Institute for Education, Hamburg, 1966-7, 1968-71. Member, Consultative Committee on UNESCO-NIER Regional Programme for Educational Research in Asia.

UNITED STATES OF AMERICA

Arthur W. Foshay

Born 1912. Ed.D., Teachers College, Columbia University; Associate Dean, Research and Field Services, Teachers College; consultant, U.S. Office of Education. Director, Bureau of Educational Research, Ohio State University, 1952-57; Executive Officer, Horace-Mann Lincoln Institute of Teachers College, 1957-66. Teacher, principal, etc., Oakland (California) Public Schools, 1936-46. Consultancies: Knesset Commission on Educational Reform in Israel, International Business Machines Corporation, Science Curriculum Improvement Project, National Education Association, Chappaqua (N.Y.) Public Schools, U. of Illinois, National Council of Churches of Christ. Author or editor; Educational Achievement of 13-year-olds in Twelve Countries, the Rand McNally Handbook of Education, Research for Curriculum Improvement, Education in Elementary School, Children's Social Values, an Action Research Study.

together with:

Robert L. Thorndike - See Page 21

Richard M. Wolf - See Page 17

Benjamin Bloom*

Fellow, Center for Advanced Study in the Bahaviorial Sciences, 1959-60; President, American Educational Research Association, 1965-66; Member, National Academy of Education, since 1966. Professor of Education, University of Chicago; Chairman, Program of Measurement, Evaluation and Statistical Analysis. Formerly University Examiner, University of Chicago. Principal advisory committees: Advisory Committee on National Educational Laboratories; Advisory Board, National Laboratory on Early Childhood Education. Principal author of: Taxonomy of Educational Objectives, Volumes I and II; Methods in Personality Assessment; Compensatory Education for Cultural Deprivation; Stability and Change in Human Characteristics. Contributing author of the International Study of Achievement in Mathematics.

C. Arnold Anderson

Born 1907. Ph.D., University of Minnesota, 1932. Member of faculty: Iowa State University, University of Kentucky and University of Chicago. Visiting Professor: Harvard University, University of California at Berkeley. Fulbright Professor: Upsala University, Sweden. Director, Comparative Education Center, University of Chicago. Professor of Sociology and Education, University of Chicago. Editor: American Journal of Psychology and Comparative Education Review. Member of Board, Sociology and Education. Member of Task Force on Comparative Education, Department of Health, Education and Welfare of the United States. Member, Board of Consultants, International Institution for Education Planning. Member, Advisory Committee, Agency for International Development.

15./.16

IEA FULL-TIME STAFF

T. Neville Postlethwaite

Born 1933. B.A. 1956 and Dip.Ed., 1957, University of Durham. Fil.lic. 1965 and Ph.D., 1968, University of Stockholm, Sweden. St. Albans College for Further Education, 1957-60. Research Officer in the Test Services Division, National Foundation for Educational Research in England and Wales, 1961-62. Co-ordinator, International Project for the Evaluation of Educational Achievement, since 1963. Author of two research monographs and has contributed to several research publications. Has also written many articles and abstracts on educational subjects.

Bruce Choppin

Born 1940. M.A. Mathematics, 1962.,Dip.Ed., University of Cambridge. Ph.D., Educational Psychology, University of Chicago, 1967. Assistant Professor of Educational Psychology at Cornell University, New York, 1966-67. Part-time research officer on IEA 1967-68. Moved to IEA staff full-time in April 1968. Responsible for the IEA English national analysis (mathematics). Has published research articles in the field of measurement and testing.

John K. Hall

Born 1938. B.Sc. in Mathematics Statistics, University College, University of London. Worked with local governemnt (Inner London Education Authority's Research and Statistics Group). Head of Surveys Unit at National Foundation for Educational Research in England and Wales. Has contributed to the final published reports of three major pieces of research, evaluation of methods of teaching arithmetics in primary schools, the IEA Mathematics Survey, and investigation into the comparability of the standards of public examining bodies.

IEA CONSULTANTS

Gilbert F. Peaker

Born 1901. Wrangler Mathematical Tripos, Cambridge University, 1923. Taught Mathematics in London University. H.M.I. Board of Education, 1933. Made Staff Inspector for educational research, 1948, responsible for the sampling design and statistical analysis of the national surveys for the Gurney, Crowther, Newsom and Plowden Reports, and the chain of national reading surveys, and other surveys for departmental use. Appointed C.B.E. in 1960. Retired from the Inspectorate on reaching the age limit in 1964. Since then statistical consultant to IEA, Schools Council and other bodies.

A. N. Oppenheim

Born 1924. Ph.D., 1956, University of London. Reader in Social Psychology at the London School of Economics, faculty member since 1952. Fellow of the British Psychological Society, Member of the European Association for the Advancement of Experimental Social Psychology, Council Member of the International Peace Research Association, Hon. Secretary of the Conflict Research Society. Author of various books and numerous articles. Contributor to the Yearbook of World Affairs.

Richard M. Wolf

Born 1934. Ph.D. from University of Chicago, 1964. Associate Professor of Psychology and Education, Teachers College, Columbia University, USA. Elementary and secondary school teaching experience, and research in secondary, higher and medical education. Member of the International Education Achievement Project for the past five years, Member of the American Educational Research Association, the American Psychological Association and the National Council on Measurement in Education. Has published over thirty articles, in the areas of measurement, evaluation, and computer applications, and is the author of chapters in several books.

MEMBERS OF IEA INTERNATIONAL SUBJECT AREA COMMITTEES

SCIENCE

L. C. Comber (Chairman)

Born 1903. B.Sc., M.A., London University. Retired H.M. Inspector of Schools. President, School Natural Science Society. Author of papers on science teaching and representative at international conferences on science curriculum reform.

Karl Hecht

Born 1903. Ph.D. at the University of Göttingen, 1928. Assistant at the Institute of Physiology, University of Bonn, 1928-30, Assistant at the Institute of Physics, University of Göttingen, 1930-34, Physicist for research and development in Industry 1934-36 in Berlin, 1936-38 in Hanau, 1938-45 in Kiel, 1945-65 in Köln. Director of the Institut für die Pädagogik der Naturwissenschaften, since 1965 and Honorarprofessor at the University of Kiel. Member of some Associations and Committees for natural science education. Author of some papers on physics experiments and science teaching.

William Hered

Born 1910. Ph.D. in organic chemistry at the University of Chicago. Examiner in physical science at the University of Chicago from 1950 to1968. Professor of Organic Chemistry at Indiana University Northwest. Author of two books. Recently Consultant on curriculum and evaluation to the University of Illinois College of Medicine, and test consultant to the American Dental Association. Member of US National Committee of Science Consultants in an aborted assessment of educational practice.

John P. Keeves

Born 1924. B.Sc. (Adel.), Dip.Ed.(Oxon), M.Ed.(Melb.). Research Fellow, Department of Sociology, Institute of Advanced Studies, Australian National University, Canberra Australia. Formerly teacher of mathematics and science in Australia and England, and Senior Research Officer with the Australian Council for Educational Research. Represented the Australian National Center in the IEA Mathematics Project, and was Hon.Federal Secretary of the Australian Science Teachers' Association from 1962-67.

Alexandra Poljakoff-Mayber

Born 1915. M.Sc., Ph.D. Hebrew University of Jerusalem, Israel. Associate Professor in Plant Physiology, Hebrew University of Jerusalem. Humanitarian Trust Fellow - Research in Plant Physiology - at King's College, London, 1953. UNESCO Fellow under Project "Salinity in Plants and Soils" 1960-61 (in the USDA Salinity Laboratory, Riverside, California, and the Soil Amelioration Institute, Tashkent, USSR). Head of the Israel Science Teaching Center. Leader of Working Group Developing Curricula in Biology for Israeli Secondary Schools. Author of two books and 75 publications in Plant Physiology.

William R. Ritchie

Born 1928. B.Sc. at University of Edinburgh, Scotland. H.M. Inspector of Schools (Physics) Scottish Education Department, St. Andrews House, Edinburgh. Member of Nuffield Physics Project Headquarters team 1962-63. Now in charge of curricula development in Physics in Scottish schools.

Shigeki Sakakibara

Born 1901. Graduated from the faculty of Engineering, Tokyo Imperial University 1925. Research Officer in Civil Aviation examination institute and Lecturer in the Department of Aeronautics, Tokyo Imperial University 1935. Professor in Toho Woman's College of Science 1946. Researcher in National Institute 1949. Director of Library attached to NIER 1957. Director of Fifth Research Department of NIER 1965. Specialist in the Science Section of Japanese National Commission for UNESCO 1966.

Sven Svensson

Born 1923. M.A. at the University of Uppsala, Sweden. Senior Master and Head of Institute for Methodology of Geography and Biology, School of Education, Stockholm. Member, Swedish Teacher Training Committee; Member, Commission on Sex Instruction in Swedish Schools, and a number of other state committees. Author of textbooks on biology and articles on quaternary geology. Script-writer for television and radio programmes, films, film strips, etc. Has visited Norway, Germany and USSR to study their educational systems.

Richard C. Whitfield

Born 1938. B.Sc.Ph.D. in chemistry at the University of Leeds, England. M.Ed. University of Leicester, England. Lecturer in Education, University of Cambridge, England. Author of two chemistry monographs and papers on science teaching.

READING COMPREHENSION

Robert L Thorndike (Chairman)

Born 1910. Ph.D. at Columbia University, New York. Richard March Hoe Professor of Psychology and Education, and Director, Institute of Psychological Research, Teachers College, Columbia University, New York. Author of: The Lorge-Thorndike Intellignece Tests, 10,000 Careers, Personnel Selection, Measurement and Evaluation in Psychology and Education, and various monographs and research articles. Special fields of interest: psychometrics and test construction, personnel selection and utilization, individual and group differences, assessment of verbal abilities.

Lily Ayman

Born 1929. B.A. Philosophy and Educational Sciences, University of Tehran, Iran. Post graduate studies in Education and Psychology at the Universities of London and Edinburgh. Is at present Director, Research and Studies Center, National Committee for World Literacy Campaign; Lecturer, National Teachers College, University of Tehran; Tehran Girls College; Chief Editor, Elementary Textbooks. Has also had experience as technical advisor, teacher and school psychologist and instructor in both Iran and the USA. Honours: Scientific Medal and Decoration, (First class), Government of Iran, 1963, Scientific Medal and Decoration, (First class), Ministry of Education, 1949. Ford Foundation Study Grant, 1959. Author of several books on education and also of several textbooks, and many papers published in education journals and reviews.

Françoise Bacher

Born 1928. Head of the Research Department at the Institut National d'Etude du Travail et d'Orientation Professionnelle. Assistant Professor at the Ecole Pratique des Hautes Etudes. Full member of the Sociétè Francaise de Pschologie. The author of many articles on research in differential psychology, school and vocational guidance, (research in particular), methodology (factor analysis, information theory, etc.)

Alan Brimer

Born 1927. M.A. University of Cambridge, England. Head of Research Unit, Institute of Education, University of Bristol, England. Chief Examiner, Wiltshire County Council. Instructor S.O.L.E.P., Stockholm, 1968. Senior Lecturer in Psychology, University College, Ibadan, Nigeria, 1957-60. Research Officer, National Foundation for Educational Research in England and Wales, 1954-57. Author of over 30 tests, and articles on Ability and Attainment, Reading, the Learning of Coded Orthographies. Co-author and editor of research reports on Teacher Education and Teacher Behavior, and Curriculum Evaluation.

Jan Vastenhouw

Born 1927. B.A. Psycology, University of Amsterdam, 1959. M.A., 1962. Scientific Cooperator at the Psychological Laboratorium, 1962-68. At present connected with the Technological University, working on educational research.

LITERATURE

Arthur W. Foshay (Chairman) - See Page 14.

Professor Foshay will relinquish chairmanship in December and Professor Purves (see bottom of Page) will become chairman.

James N. Britton

Born 1908. Experience as teacher, in publishing and as lecturer in the University of London. Research interests in the educational/psycholinguistics area, and in particular in the application of statistical measures to value judgements. Publications include: "Experimental Marking of Compositions Written by 15-Year-Olds", "Multiple Marking of English Composition" (with N. C. Martin and H. Rosen), "The Role of Language in Learning in the Elementary School", "Responses to Literature", "Talking and Writing", "The Arts in Education", (both as editor), "The Oxford Books of Verse for Juniors", "The Oxford Books of Stories for Juniors".

Gilbert L. de Landsheere - See Page 9.

Gunnar Hansson

Born 1922. Ph.D., University of Uppsala, Sweden. Assistant Professor in literary history at the University of Göteborg, Sweden. The author of three books and a number of articles, mostly on research into how different groups of people interpret and respond to works of literature.

Alan C. Purves

Born 1931. Ph.D., Columbia University, New York, USA. Former examiner in the Humanities, Educational Testing Service, Princeton, New Jersey; currently Associate Professor of English, University of Illinois, Urbana, Illinois. Member, Modern Language Association of America; Committee on Research, National Council of Teachers of English; consultant, Aesthetic Education Project, Central Midwest Regional Educational Laboratory. Author of some 12 books and articles on English Literature and the teaching of Literature, including "The Elements of Writing about a Literary Work". Has written on rhetoric, criticism, literary response, on testing in literature, and on the curriculum in Literature.

ENGLISH AS A FOREIGN LANGUAGE

Evan Glyn Lewis (Chairman)

Born 1908. Graduated University of Wales. Former H.M. Inspector with responsibility for educational research in language teaching, and especially for English abroad. Secretary of the Central Advisory Council for Education (Wales), and of various committees of the Schools Council (England and Wales). Visiting Lecturer at the Ontario Institute for Studies in Education in 1965,1967 and 1968. Author of various books and monographs on bilingualism, and multilingualism, and a number of papers in international journals. At present senior Research Fellow of the University of Wales, Swansea.

Esther Heitner

Born 1927. M.A. Hebrew University, Jerusalem. (English History, Psychology-Education), Diploma Course for EFL - Institute of Education, London; (1960-1); Post Graduate Course in TEFL - Methods and Material Preparation, Teachers College, Columbia University. (1965-66). Has had much experience as a teacher in secondary schools and training colleges and at Bar-Ilan University, also as counsellor. Is at present Inspector of General and English Studies, Department of Secondary Education, Ministry of Education and Culture, Jerusalem; Member of Educational Television Committee; Member of EFL Curriculum Planning Center; Member of Testing Committee.

Pierre Morette

Born 1909. 1929, exchange teacher at John Adam High School, Western Reserve University, Cleveland, Ohio. 1932, degree at University. Author of "Les Trois Etapes de la Correction Grammaticale en Anglais". Senior Master at the Lycée Henri IV, Paris.

Agnes M. Niyekawa-Howard

Born 1924. B.A. Tokyo Woman's Christian College. (English) B.A. (Sociology) University of Hawaii. 1952. M.A. (Psychology) Bryn Mawr College, 1954. Ph.D. (Social Psychology) New York University, 1960. Has had much experience as Researcher, Lecturer, Postdoctoral Research Fellow, Postdoctoral Fellow in Linguistics, Instructor and Professor in Universities in the United States and Hawaii. Is the Director and Principal investigator of the project entitled "A Study of Second Language Learning" under US Office of Education. Principal investigator "A Psycholinguistic Study of Language and Thought" under National Institute of Mental Health. Is the author of many books, articles, booklets, reports and papers on psycholinguistics, linguistics, and social psychology.

English as a Foreign Language Committee - cont.

Rauno Piirtola

Born 1935. M.A., University of Helsinki, Finland, and at the University of Michigan, Ann Arbor. Lecturer in Language Didactics at the University of Jyväskylä, Finland. Research Assistant (foreign language school achievement tests) at the Institute for Educational Research, University of Jyväskylä, 1965-66. Now formerly attached to the Institute of Educational Research through the IEA Project. The writer of some ten articles on foreign language learning and testing. Special fields of interest: foreign language learning at the primary stage and textbook preparation.

Clifford H. Prator

Born 1911. Ph.D. in Romance Languages at the University of Michigan. Professor of English and Vice-Chairman of Department of English (with responsiblility for English as a Second Language activities), University of California, Los Angeles. Member of the National Advisory Council on Teaching English as a Second Language, 1964-67; Supervisor of the Philippine Center for Language Study, 1957-65, and the Instituto Linguistico Columbo-Americano, 1964-66; Field Director of the Survey of Language Use and Language Teaching in Eastern Africa, 1967-68. Served as a consultant for a number of governmental agencies and foundations. Articles and monographs on language policy, American English pronunciation, bilingual education, and the methodology of language teaching.

Ian Dunlop

Born 1925. M.A. (Cantab.) English consultant to the Extra-Mural Department of the University of Stockholm, 1950-55, Director of Studies at the British Center, Stockholm, Sweden, 1956-68. Lecturer, University of Stockholm, from 1969. Has published about 20 textbooks for teaching English as a foreign language; also written and presented 70 television programs in Sweden for teaching English to foreigners, 30 of which have been transmitted in Denmark, Portugal, Austria, and Switzerland. Has also written and recorded several gramophone courses and tape courses for teaching English, has experimented with programmed learning for different levels of achievement and has written a book on the application of programmed learning principles to the analysis of literature. Swedish Filosofie Licentiat Thesis, 1968, on Practical Techniques in the Teaching of Oral English.

FRENCH AS A FOREIGN LANGUAGE

John B. Carroll (chairman)

Born 1916. Ph.D. at the University of Minnesota. Senior Research Psychologist, Division of Psychological Studies, Educational Testing Service, Princeton, N.J. Assistant professor to professor, Harvard Graduate School of Education, 1949-67. Founding member of the National Academy of Education; Fellow of the American Psychological Association; numerous other affiliations including the Linguistic Society of America; the Modern Language Association of America, the American Council of Teachers of Foreign Languages, and the Psychometric Society. The author of three books in the field of language, as well as numerous research articles and monographs in the field of language teaching and testing, psychometrics, and the psychology of language.

Clare Burstall

1953, Honours degree in French, University of London, 1953 - 1955, Postgraduate awards at the Sorbonne and the University of London (French Contemporary Poetry) 1963 Honours degree in Psychology, (London). Employment with the National Foundation for Educational Research in England and Wales, since 1964. Currently Senior Research Officer in charge of project evaluating the teaching of French in primary schools. Also supervising a survey of psycholinguistic and sociolinguistic research. Author of "The French Project : an interim report". "French From Eight : A National Experiment". NFER occasional publication. Contributor to "Languages and the Young School Child"

Guy Capelle

Born 1926. Agregation, Paris. Associate Director for overseas research of the Center for Research on Language and Language Behavior, University of Michigan, Ann Arbor, USA. Director of CRLLB European Bureau. Former Director of Bureau d'Etude et de Liaison pour l'Enseignement du Francais dans le Monde: 1959-65. Visiting Professor at the University of Michigan: 1965-67. The author of articles on applied linguistics and the teaching of modern languages, and of text-books for the teaching of English and French.

Erland Kruckenberg

Born 1913. M.A. and "fil.lic." of Romance Languages at the University of Uppsala, Sweden. Senior Lecturer and Head of Institute for Methodology of French, School of Education, Stockholm. Chairman of National Association of Language Teachers 1952-57. Author of articles on linguistics and methodology, and a dozen textbooks and manuals for the teaching of French in Swedish schools.

W.E. Lambert

Professor of Psychology, McGill University, Montreal, Canada, specializing in Experimental and Social Psychology. Research interests include the study of bilingualism and second language learning, and both psycholinguistics and sociolinguistics.

H.N. Simai

Born 1924. Ph.D. (French Langauge and Literature) at University of Paris, Sorbonne. Professor of the French Language and Head of the Department of French Language, National Teachers' College, Tehran, Iran. Instructor of French Language, Faculty of Letters, University of Tabriz, Iran, 1949-57. Principal, Kourosh Secondary School, 1961-2. Professor and Head of the Department of French Language, National Teachers' College, 1962-8. Chairman of Curriculum Development Committee for French as a Second Language, Ministry of Education, Iran. Author of two books, "Brief History of Contemporary French Literature" and "Teaching Introductory French to Iranians". Specialist in teaching French as a second language.

John L. D. Clark

Born 1936. M.A. in Romance Languages at the University of North Carolina. Ed.D. in Research in Instruction at Harvard University. Teaching Fellow in French, University of North Carolina; Research Assistant and Teaching Fellow, Harvard Graduate School of Education. Currently Associate Examiner in Foreign Languages, Educational Testing Service, Princeton, N.J.. Major fields of interest: techniques of language instruction, developmental research in language achievement testing.

Russell F. Farnen (Chairman)

Born 1933. B.S. Central Connecticut State College, 1956, M.A. Peabody College, 1957, M.A. Syracuse University, 1960, S.Sc.D Syracuse University, 1963. Associate Professor of Political Science, Peabody College, Nashville College. Tennessee. Teaching Graduate and Instructor, Syracuse University, 1957-60; Instructor and Assistant Professor of Social Science, University, 1960-64; Examiner, Princeton, N.J., and Visiting Professor at Nassau Community College, Trenton State College and Mount Vernon College, 1964-67. The author of several books and aticles, book reviews and booklets on teaching, education and government.

Aldo Fabi

Professor of Cultural Anthropology, Assistant, Department of Psychology and Faculty of Education, University of Urbino. Central Inspector of the Ministry of Education, Italy. Author of a book on student evaluation and of some articles on teaching and school organization.

Charity James

Born 1912. M.A., St. Hugh's College, Oxford (Classical Honour Mods II). Glasgow University teaching ethics, studying Logic. Witney International Fellow, Radcliffe College, Cambridge, Mass. Director, Curriculum Laboratory, Goldsmith's College, University of London; Director and first Chairman, Western Theatre Ballet; Governor of various secondary schools; Member of British National Education Committee of ICOM. Formerly Member of Executive Committee, Association of Teachers of Social Science; Member of C.R.E.D.O. team on social studies in African Primary schools; Lecturer and Principal Lecturer at Goldsmith's College.

Sixten Marklund

Born 1921. Ph.D., University of Stockholm, Sweden. Head of Compulsory School Bureau, later of Teacher Training Bureau, National Board of Education. Chief Secretary of the Swedish Teacher Training Committee. Member of a number of State Committees on the Swedish School Reform. Member of the Scandinavian Expert Committee on Educational Research. Contributor to and Examiner of National Reports on Education at OECD, Paris. Professor of Education, University of Stockholm, 1965-66. The author of books and articles on teacher training, the try-out period of the Swedish Comprehensive School, student achievement in school classes of different size and homogeneity, curriculum for the comprehensive school, school discipline, teacher attitudes towards innovations in education etc.

Mohammed Mashayekhi

Born 1936. Ph.D. at Brussels University and Paris University. Professor of Education and Director of Management and Training Institute, National Teachers' College, Tehran, Iran, since 1963. Director General, Curriculum and Planning, Ministry of Education, Iran. Technical Director General, Ministry of Education, Iran. Director General of Secondary Education, Ministry of Education, Iran. Head, Department of Curriculum and Planning, Ministry of Education, Iran. Inspector and Counsellor of High School System in Tehran, Iran. High School Principal. Science Teacher in Secondary Schools. Received Scientific medal and Decoration (First Class), Ministry of Education, Iran. Author of a 3-volume book on Comparative Education.

Franklin Patterson

Born 1916. Ph.D. at Claremont Graduate School, California. President, Hampshire College, Amherst, Massachusetts, USA. Professor of Education and Government, and Director of the Lincoln Filene Center for Citizenship and Public Affairs, Tufts University, 1957-67. Staff director and member, Carnegie Commission on Educational Television, 1965-67. Senior Scholar, Social Studies Curriculum Program, Education Development Center (formerly ESI) Cambridge, Massachusetts, since 1962. The author of six books and numerous articles. Has written on adolescent political socialization, research on youth and community development, curriculum in secondary education, and the nature of undergraduate education.

Judith V. Torney **(Part-time member)**

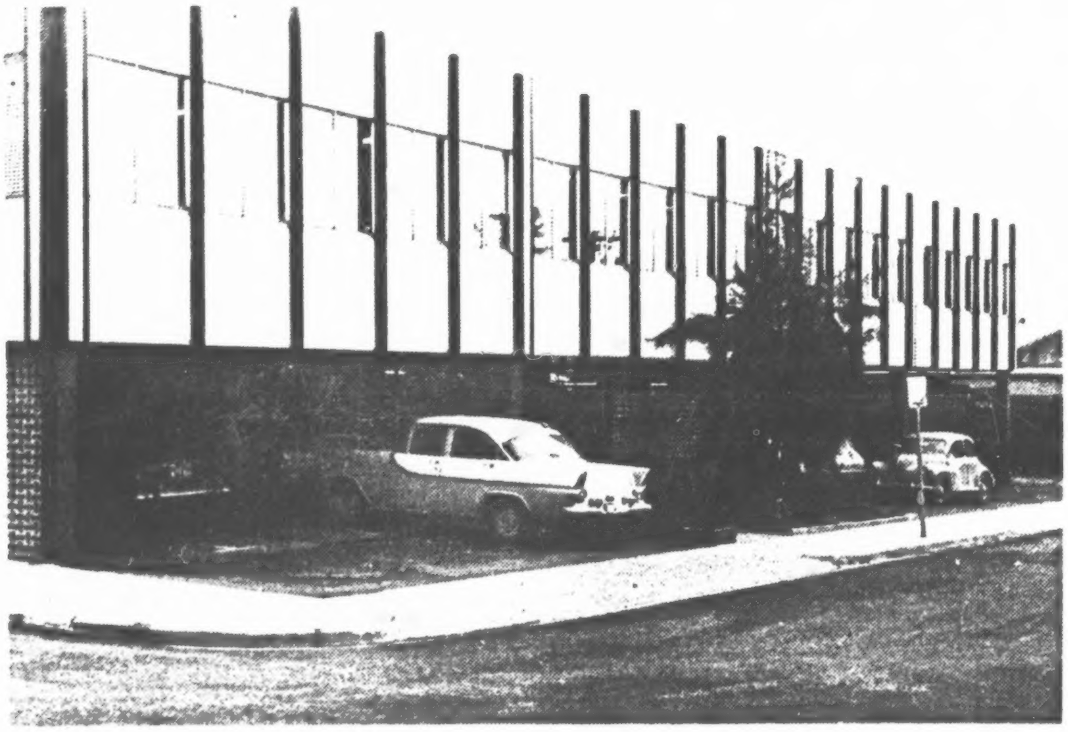
Born 1937. Psychology degree, Stanford University, A.B. 1959. M.A. 1962, Ph.D. 1965 (human development), University of Chicago. Co-author with Robert Hess of The Development of Political Attitudes in Children, a study of the civic attitudes of 12,000 children from eight United States cities. Also author and co-author of several papers on related topics. Assistant Professor of Psychology, Illinois Institute of Technology, Chicago, Illinois.

A. N. Oppenheim - See Page 17.

IEA NATIONAL CENTRES

AUSTRALIA

AUSTRALIAN COUNCIL FOR EDUCATIONAL RESEARCH
Frederick Street,
Hawthorn,
Victoria,
Australia, 3122



The Australian Council for Educational Research is an independent non-governmental organisation, financed by grants from State and Commonwealth Governments, and from the sale of educational and psychological tests, educational materials, and testing services.

Functions

i. It undertakes general research into educational problems in comparative education, cognitive development, curriculum and school organization, and measurement and evaluation.

ii. It develops tests for use in educational and other institutions, for psychological or educational purposes, either for general use, or on contract.

iii. It develops educational materials for use in schools, such as an individualized mathematics program, a kit of materials and assignments for use in junior secondary school science.

iv. It provides advisory services to teachers, a library service to research workers, and an information service on aspects of Australian education, through the publication of quarterly reviews on selected topics and in response to specific enquiries.

Australia.

Staff

Its staff fluctuates according to the nature of work done - e.g. additional staff are employed for preparing particular tests. At present (1968) there are approximately:

30 Professional staff

60 Other staff

Of these, only some six of the professional staff can be considered full-time research staff, and even they have other commitments.

Budget

Approximately $40,000 Australian per annum from regular funds, and another $20,000 per annum on library and information services. These sums exclude any special projects, funded in other ways, any test development work, or any work in materials development.

Université de Liège,
LABORATOIRE DE PEDAGOGIE EXPERIMENTALE,
Institut de Psychologie et des Sciences de l'Education,
3, Place Cockerill,
Liège,
Belgium.

The Institute is a department of the State University of Liège.

Functions

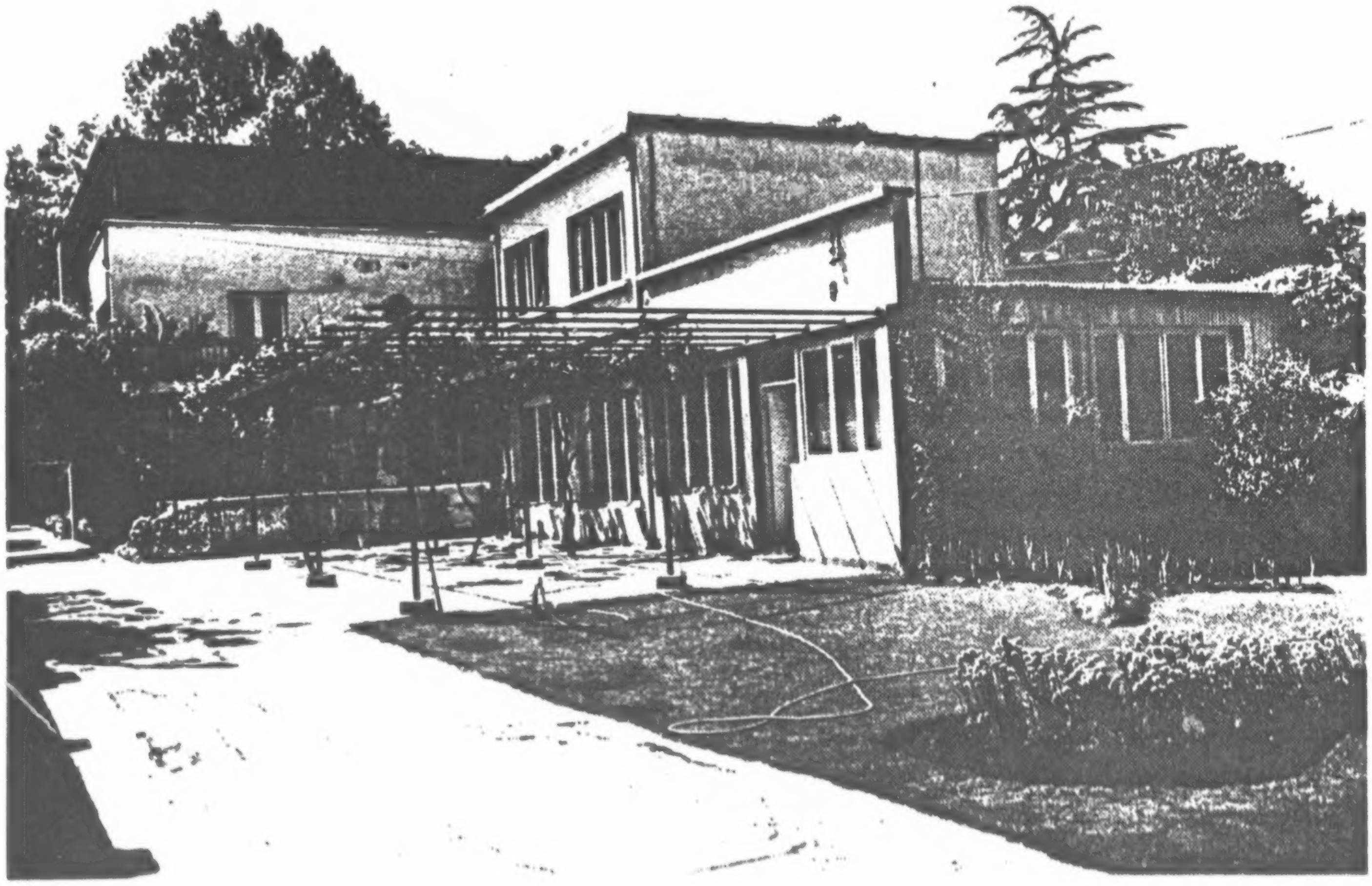
The main function of the Laboratory is educational research. The present projects being undertaken are on teaching, on reading, and on readability and visibility formulae. The Institute also trains teachers and research workers.

Budget

Salaries, premises and equipment are paid for by the University. There is also a small sum for buying stationary, tests and small machines. An estimate, including salaries, etc. for the whole year is 2.500.000 Belgian Francs. ($50,000)

CHILE

Univerisdad de Chile,
INSTITUTO DE INVESTIGACIONES ESTADISTICAS,
J.P. Alessandri 685,
Santiago,
Chile.



The Institute of Statistical Research is a Central Institute of the Univeristy of Chile.

Functions

It is engaged in research on higher education, mainly concerned with Univeristy statistics and test development, with special reference to entrance examinations.

It advises on evaluation in the different faculties.

Staff

Professional staff : 17 members

Other staff : technical - 14 members
administrative - 6 members
maintenance - 5 members

Budget

E° 821.000 (U.S.$ 100,000) p.a.

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ENGLAND

NATIONAL FOUNDATION FOR EDUCATIONAL RESEARCH IN ENGLAND AND WALES
79, Wimpole Street,
London, W.1,
WIM 8EA,
England.

together with:

The Mere,
Upton Park,
Slough,
Bucks,
England.

The National Foundation for Educational Research is a partnership of all those concerned with public education in England and Wales, and is concerned with the study of problems arising at all levels within the national educational system. It is an independent institution receiving financial support and co-operation from its membership which includes all local education authorities, national associations of teachers, universities and university institutes, colleges of advanced technology, H.M. Forces and associated educational organizations. It receives an additional grant from the Department of Education and Science.

Functions

i. To conduct research in all or any matters affecting education.

ii. To publish from time to time reports embodying the results of its own research and to assist financially or otherwise in the conduct or publication of research done under the auspices of other bodies or by individuals.

English National Center - cont.

iii. To act as a liaison body with any international body for research in education.
iv. To act as an advisory body to the Department of Education and Science, to other Ministries or Government Departments, to Local Education Authorities.
v. To act as a vehicle for interchange of educational ideas and to collect and provide information on educational questions.
vi. To organise and conduct conferences and courses open to all interested in education and to arrange for the provision of information.

Staff

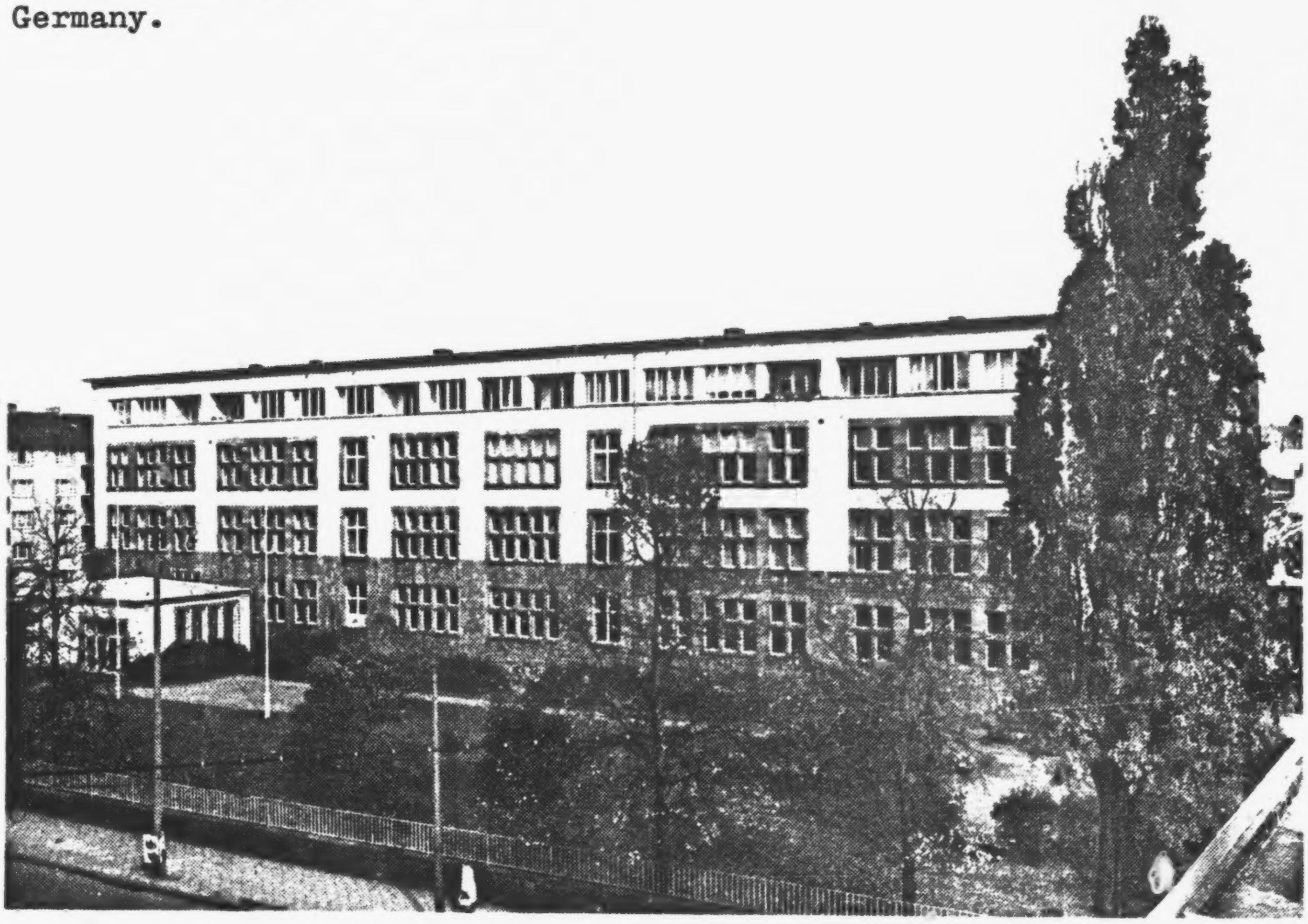
Permanent staff : Professional - 74
: Other staff - 70

Budget

The total research budget for the academic year 1967/8 was £208,000. ($520,000)

FEDERAL REPUBLIC OF GERMANY

DEUTSCHES INSTITUT FÜR INTERNATIONALE PÄDAGOGISCHE FORSCHUNG,
6000 Frankfurt/Main,
Schloßstraße 29,
Germany.



The Deutsches Institut für Internationale Pädagogische Forschung is an independent foundation under public law within the "Königsteiner Abkommen" of the Länder in the Federal Republic.

Functions

Its functions are in the fields of research in education through the co-operation of its various departments:

General and comparative Education department,
Educational Psychology department,
Sociology of Education department,
Law and Administration of Educational Research department,
Statistics and Methods of Educational Research department.

Staff

Professional staff : 36

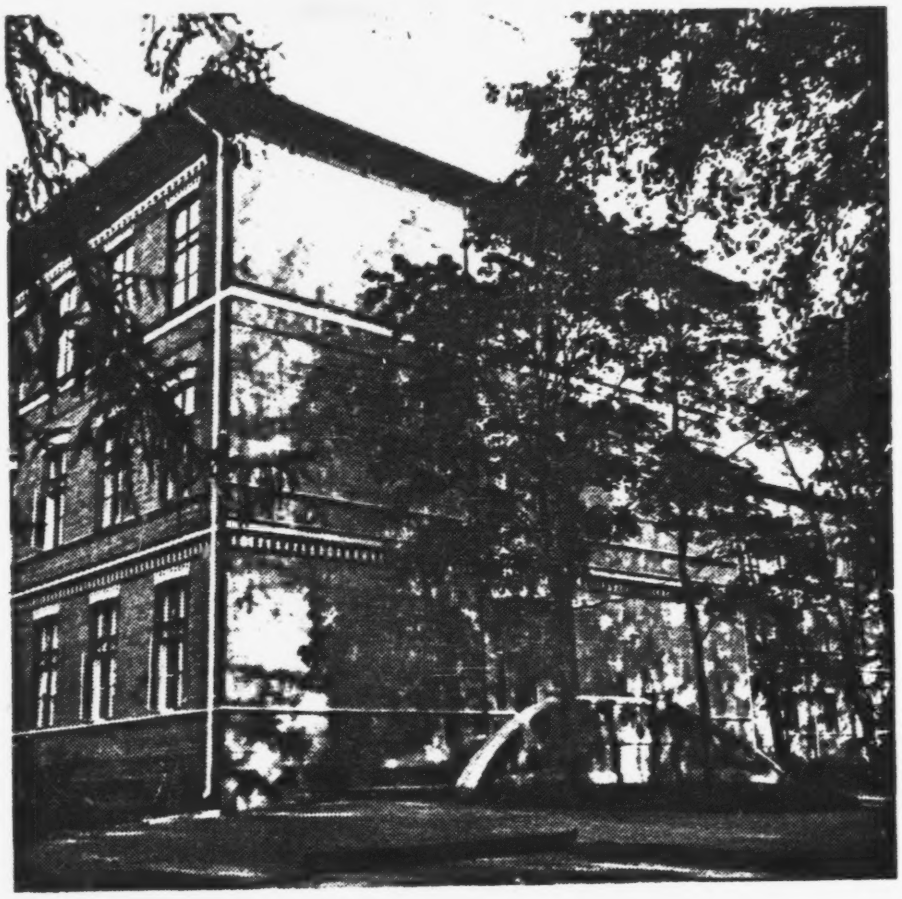
Other staff : 21

Budget

Total budget without research grants : 1 543 700 DM
($308,740)

FINLAND

CENTER FOR EDUCATIONAL RESEARCH,
University of Jyväskylä,
Jyväskylä
Finland



The Center for Educational Research has an independent status within the State University of Jyväskylä.

Functions

These are divided between fundamental research and applied work in connection with school reform. The main focus of basic research is at the present on language development (vocabulary, reading and writing tests, foreign language tests, enrichment programs, reading disabilities, etc.) Other research is mainly directed to various phases of physical education; to student and teacher attitudes, the effects of the introduction of television, and personality ratings.

Staff

Professional staff : 20

Other staff : 5

Also some temporarily engaged personnel.

Budget

Total research budget for 1967/8 : Fmk. 203.000 ($48,200)

FRANCE

INSTITUT NATIONAL D'ETUDE DU TRAVAIL ET D'ORIENTATION PROFESSIONNELLE,
41, Rue Gay-Lussac,
Paris Ve,
France.

This is an Institute of the Conservatoire National des Arts et Métiers. (Ministère de l'Education Nationale).

Functions

The training of advisors (counsellors) in school and vocational guidance, and also research in the guidance field.

Staff

10 Researchers

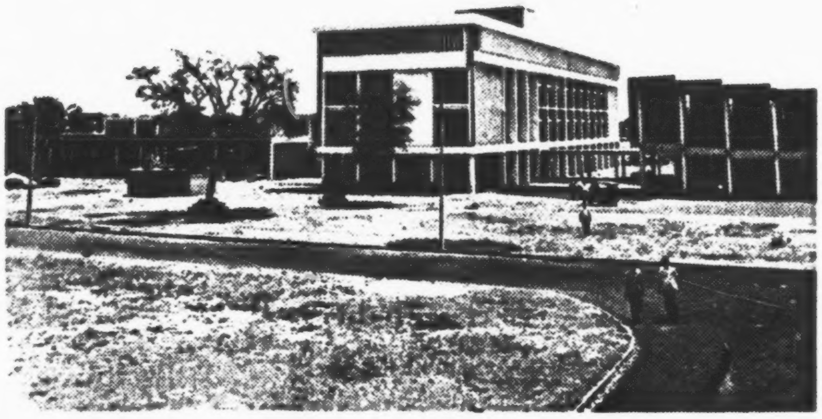
4 or 5 Temporary staff.

Budget

The total budget for 1967/8 is about 145,000 F. ($29,000)

INDIA

NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING,
National Institute of Education,
Mehrauli Road,
New Delhi 16,
India.



The National Institute of Education was established by the National Council of Educational Research and Training. It is an autonomous body registered under the Societies Act.

Functions

Its functions are research, advanced training of educational administrators, teacher educators and other high level personnel in the field of Education, and the provision of extension services.

Staff

Professional staff : 645

Other staff : 721

Budget

The total budget for the year 1967/8 - Rs.178.74 lakhs.
approx. ($1,000,000)

IRAN

INSTITUTE FOR EDUCATIONAL RESEARCH AND STUDIES

P.O. Box 3071,
49, Roosevelt Avenue,
Tehran,
Iran.

The Institute for Educational Research and Studies (IERS) is one of the four institutions which comprise the National Teachers College. It was established in 1964.

Functions

To expand and guide educational and psychological research, to encourage and train specialists in scientific research, and to consolidate the scientific foundations of education and psychology in Iran. IERS activities center round conducting pure and applied research studies, psychological and educational experimentation and survey research, test development and standardization, guidance and counselling services, data processing, library and documentation services, teaching and training activities, publications, and international relations.

Staff

Professional	20
Other staff	10

Budget

Research budget for academic year 1967/8 - $50,000

ITALY

CONSIGLIO NAZIONALE DELLE RICERCHE,
Istituto Nazionale di Psicologia,
Piazzale delle Scienze 7,
00100 Rome,
Italy.

ISTITUTO DI FILCSOPHIA DELL'UNIVERSITA DI ROMA,
Cattedra di Pedagogia,
00100 Rome,
Italy.

The National Center duties for Italy are being shared by two institutions; the first mainly deals with technical work, such as test adaption, editing and printing, collection and analysis of data, as well as administrative and clerical tasks; the second mainly works on test content, school curricula, and relations with educational authorities.

Functions

Institute of Psychology: research work in the field of psychology. Its activities include experimental work, test development, occasionally teaching and consulting services.

Institute of Philosophy: research work in education and educational psychology.

Staff

Institute of Psychology: Professional staff - 14 research psychologists and 2 laboratory assistants. Other staff - 1 laboratory technician and 3 clerical and administrative employees.

Institute of Philosophy: 1 Professor, 1 Assistant Professor, 1 Instructor, and 4 part time assistants.

Budget

Institute of Psychology: about 150,000,000 lire ($240,000)

Institute of Philosophy: 1,500,000 lire (2,400$)

JAPAN

NATIONAL INSTITUTE FOR EDUCATIONAL RESEARCH,
6-5-22 Shimomeguro,
Meguro-ku,
Tokyo,
Japan.

Functions

The carrying out of practical and fundamental research on education on a rather long-term basis with the purpose of producing basic data necessary for the establishment of the educational policies of the state and local governments. The Institute has five research departments dealing with all aspects of educational research and administration, guidance, finance and evaluation, and an external service department, dealing with educational studies in Asia.

Staff

Professional staff: 52

Other staff : 38

Budget

Total research budget for 1968/9., 146,454,000 Yen.
about (400,000$)

NETHERLANDS

STICHTING RESEARCH INSTITUUT VOOR DE TOEGEPASTE PSYCHOLOGIE AAN DE UNIVERSITEIT VAN AMSTERDAM,
Herengracht 510,
Amsterdam C,
Netherlands.

Functions

The main functions of the Research Institute are - educational research, school psychology and test construction.

Staff

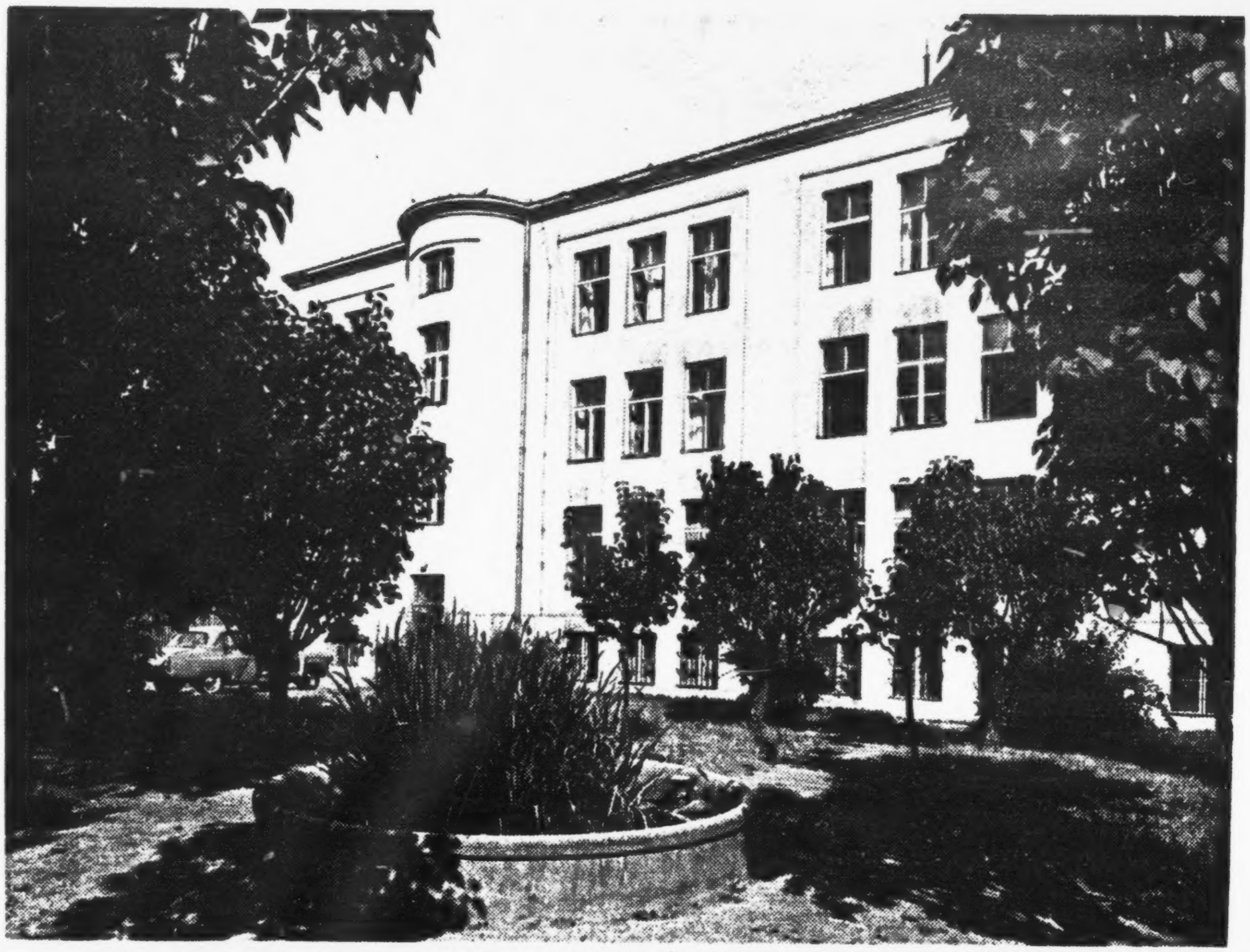
Professional staff : 1 Educator
2 Psychologists
1 Mathematician
2 Linguists
Other staff : 8

Budget

Total research budget 1967/8 Dfl. 325.000,-. ($89,779)

POLAND

INSTYTUT PEDAGOGIKI,
Warszawa,
ul. Górczewska 8,
Poland.



The Institute is the main Polish center for educational research, dependent on the Ministry of Instruction and Higher Education. It was established in 1950.

Functions

The Institute is divided into six scientific departments or administrative departments; their main functions are: research in the fields of curriculum, modernisation and methods of teaching, psychology, sociology, organization, study of achievement, and construction of tests, educational documentation and information, and provision of specialized library facilities.

Staff

Professional staff:	10 Professors 52 Researchers
Other staff :	10 technical workers 7 librarians 21 administrators

SCOTLAND

THE SCOTTISH COUNCIL FOR RESEARCH IN EDUCATION
46 Moray Place,
Edinburgh 3,
Scotland.

The Scottish Council for research in Education occupies only the top left hand six windows of the building.

The Scottish Council for Research in Education has been for the last forty years the national center for educational research in Scotland.

Functions

These can be described under - conducting research through committees of the Council; sponsoring research to be conducted by persons or groups on the Council's behalf; coordinating the research efforts of others and arranging for facilities to be provided for projects approved by the Council but executed by others; publishing the results of educational research conducted in Scotland; maintaining registers of current research and completed research in Scotland and a library of research journals; advising bodies or persons engaged in research; disseminating the results of research; making grants to persons or bodies requiring financial assistance to undertake research projects.

Staff

Includes a Director, Deputy Director, Assistant Director, Secretary and clerical staff. Research Officers are also engaged for specific projects.

Scottish National Centre.

Budget

For the year 1967/8 - £38,000 ($152,000), most of which was provided by the Scottish Education Department, although education authorities which administer the school system also made a substantial contribution.

SWEDEN

PEDAGOGISK-PSYKOLOGISKA INSTITUTIONEN,
Lärarhögskolan i Stockholm,
Fack,
100 26 Stockholm 34,
Sweden.

The Institute was founded by a Parliamentary Act as part of the new set-up for teacher training following the School Reform. The Institute took part in the research preceeding the reform of the comprehensive school in 1962 and the gymnasium reform in 1964.

Functions

Until 1964, the main focus of its research has been on school structure (differentiation problems, reserve pool of ability) and curriculum content. After 1962, its research activities have to large extent focused on the construction and development of "material-methods-systems" (individulized reading material in Reading, instruction in English and Religion), development of tests of scholastic aptitude. A series of projects most appropriately classified as basic research (twin studies, follow up of adult careers as related to early school performance, IQ and social background) have been conducted all the time.

Staff

Professional staff : 40

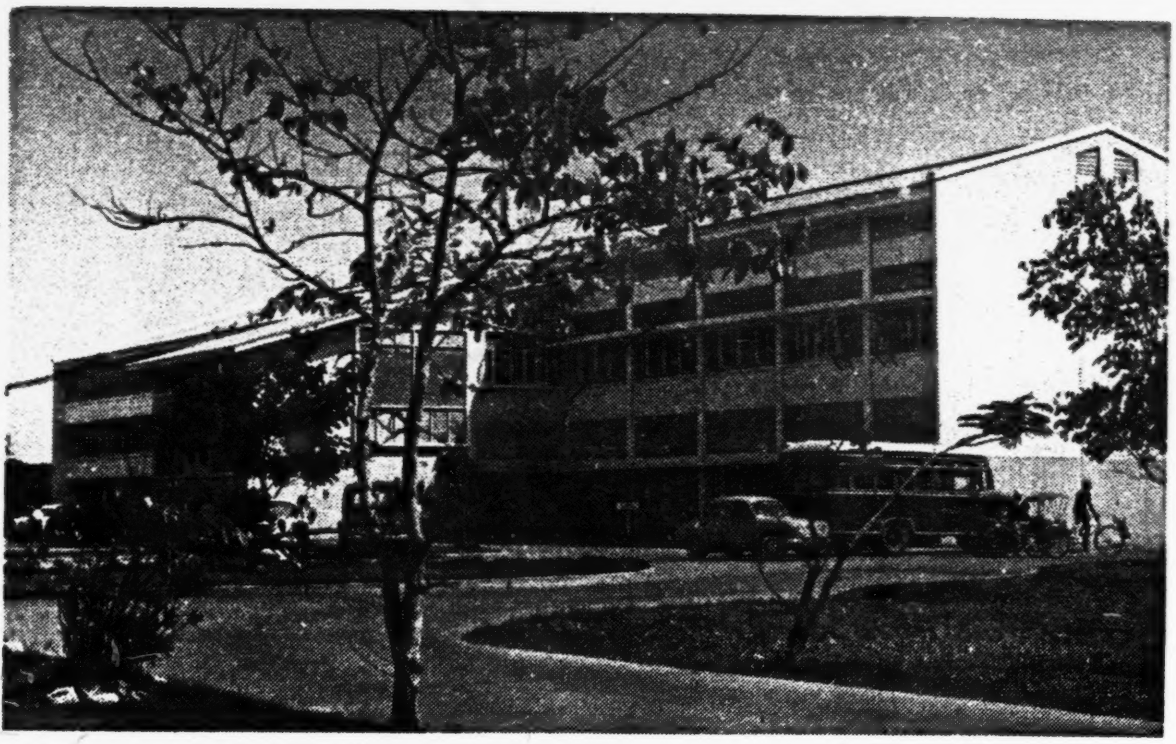
Other staff : 20

Budget

Swedish Crowns 1,200,000 ($240,000)

THAILAND

BANGKOK INSTITUTE FOR CHILD STUDY,
Sukhumvit Soi 23,
Bangkok,
Thailand.



The Institute was established in 1955, as a joint venture of UNESCO and the Government of Thailand.

Functions

To carry out cross-cultural research on child development; to disseminate research findings for the improvement of the care and education of children in school and at home; to provide training of research workers from Thailand in research methodology and principles of child development and child guidance; to provide training for research workers from abroad.

Staff

Professional staff : 19

Other staff : 4

Budget

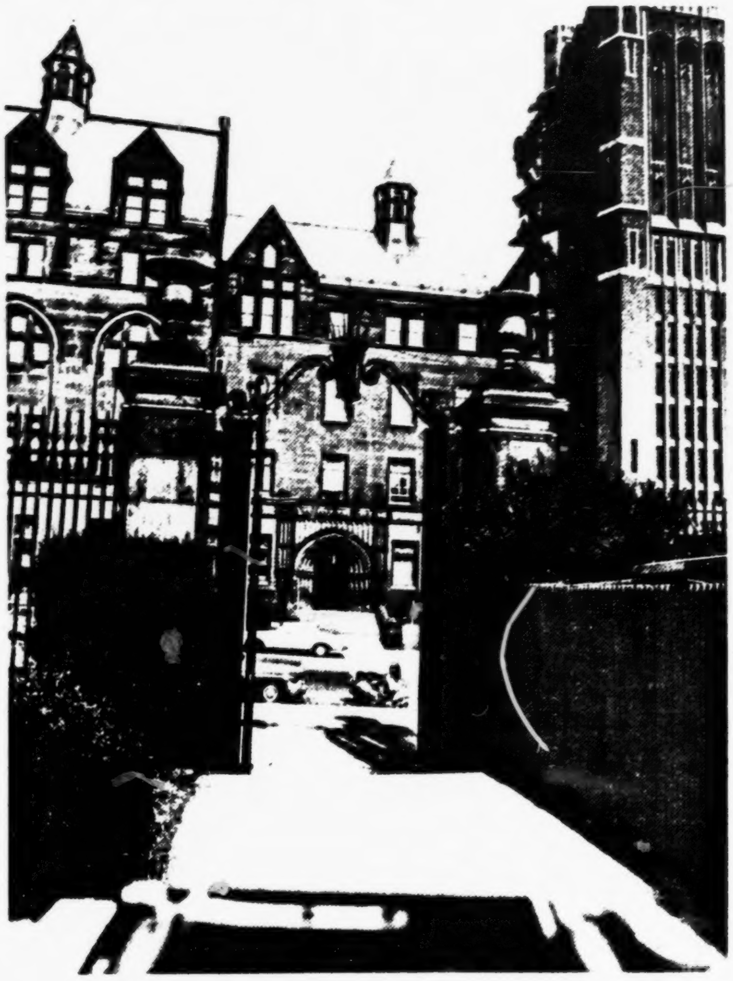
The total research budget for the fiscal year 1967/8 -($40,000) 840,000 Baht.

UNITED STATES OF AMERICA

TEACHERS COLLEGE,
Columbia University,
New York, N.Y. 10027,
USA.

together with:

DEPARTMENT OF EDUCATION,
University of Chicago,
5835 Kimbark Avenue,
Chicago, Illinois 60637,
USA.



Teachers College, Columbia University and the Graduate Department of Education of the University of Chicago combined forces and serve as the National Center in the United States. Teachers College, however, has been the main operation center during Phase II, Stage 1 of the IEA Project.

Teachers College

Functions

i. Teachers College offers a great range of courses to doctorate level, varying from Health Science, to Psychology and Social Sciences, and

ii. Courses to doctorate level for administrators and teachers of all subjects taught in the lower school.

iii. International Study in Research carried out in Asia, Africa, Europe and South America,

iv. Overseas Technical Assistants Projects in various parts of the world.

Staff

195 Professorial staff.

54. American National Center.

Budget

Total research budget: $3,500,000.

IEA NATIONAL TECHNICAL OFFICERS

AUSTRALIA

Malcom J. Rosier

Born 1935. B.Sc. and B.Ed., University of Western Australia. Senior Research Officer, Australian Council for Educational Research. Ten years' teaching experience in secondary school mathematics and science with the Education Department of Western Australia. One year as lecturer in Experimental Education, Further Education Center, Western Australia. Author of two books for lower secondary school science. Has done research in computer-aided instruction, and is interested in computer-aided counselling and guidance.

BELGIUM

Georges Henry

Born 1933. Teacher of mathematics. Licencié in Educational Sciences at the University of Liège. Research on readability and television.

CHILE

Christina Rodriguez

1954 B.A. in Humanities. 1960 M.A. in English and Education and Minor in Psychology. Participated in various seminars and courses (1964-68) on Test Construction and Educational Statistics. Positions held at the University of Chile - Assistant Professor in Educational Statistics at the Faculty of Philosophy and Education, 1963-8; Research Assistant at the Institute of Statistical Research, 1963-7. Full time Researcher, since 1968.

ENGLAND

John K. Hall - See Page 15.

(Until 1968)

FEDERAL REPUBLIC OF GERMANY

Lothar Riemenschneider

Born 1930. Primary and Secondary School Teacher. Teachers training at University and Teacher-Training College. Eight years teaching experience in primary and secondary schools, especially in Mathematics and Science. Since October 1963, Research Officer, Deutsches Institut für Internationale Pädagogische Forschung. Author of Technical Word-Knowledge Test.

Helmut Vorkauf

Born 1938. B.A. in Psychology, J.W. Goethe Universität in Frankfurt, Germany. Currently Research Fellow and advisor for experimental design, and also engaged in the statistical analysis of the projects of the Deutsches Institut für Internationale Pädagogische Forschung.

FINLAND

Kimmo Leimu

Born 1936. B.A. at the University of Jyväskylä, Finalnd. Teacher, at the Teachers College in Helsinki. Assistant at the Department of Psychology, University of Jyväskylä, 1963-7. M.A. (thesis), 1967, on empirical formation of verbal association hierarchies. Field of interest: verbal learning and verbal behaviour.

Jorma Kuusinen

Born 1940. Licentiate of Education at the University of Jyväskylä, Finalnd. Research Assistant, Center for Educational Research, 1962-67. Assistant at the Department of Psychology, University of Jyväskylä, since 1967. Visiting scholar at the University of Illinois, USA, 1967-8. Articles on school subject preferences, personality ratings, sociometry, and the evaluation of school achievement. Special fields of interest: cross-cultural studies of psycholinguistics and personality.

FRANCE

Denis Bonora

Born 1938. Licencié en Lettres. Student and professional advisor, at Nantes, 1965-7. Research Department of the Institut National d'Etude du Travail et d'Orientation Professionnelle.

INDIA

Perin H. Mehta

Born 1926. M.A. in English Literature, University of Bombay; M.A. Applied Psychology, University of Patna; M.A. Education; Ph.D. Counselling Psychology, Columbia University, Officiating Head, Department of Psychological Foundations, National Institute of Education, New Delhi; Director, Central Bureau of Educational and Vocational Guidance, Department of Psychological Foundations, National Institute of Education, 1961-7. Assistant Educational Advisor, Ministry of Education, Government of India, 1960. Visiting Associate Professor, University of Oregon, USA, 1966-7. Publications on Guidance, and Counselling; co-editor of "First Mental Measurement Handbook for India".

A. B. L. Srivastava

Born 1934. M.Sc. from Lucknow University and Ph.D. in Statistics from the Institute of Technology, Kharagpur, India. Reader, Department of Psychological Foundations, National Institute of Education, New Delhi; Professor and Head of Statistics Department, Meerut College, Meerut, 1959-63. Published research papers in Biometrica and Psychometrica on Robustness of Tests, estimation of true scores, etc.

Atmananda Sharma

Born 1927. M.A. in Psychology, M.Sc. in Mathematics, Ph.D. at the Agra University, India. Reader, Department of Psychological Foundation, National Institute of Education, New Delhi. Scientific Officer (Psychology), Directorate of Psychological Research. Ministry of Defence, Government of India, 1958-62. District Psychologist/Vocational Guidance Officer, Bureau of Psychology, Uttar Pradesh, Allahabad, India. 1952-58. Lecturer, Teachers Training College for Graduates, 1948-52. The author of about 18 research articles, mechanical aptitude tests, a book on experimental psychology.

Snehlata Shukla

Born 1927. M.A. in Mathematics from University of New Delhi and M.A. Education from University of Hawaii, study at the University of Chicago. Reader, Department of Psychological Foundations, National Institute of Education, New Delhi. Long experience of working on tests of intelligence, achievement and aptitude. Constructed and standardized tests of achievement and aptitude.

IRAN

Kita Tabari

Born 1941. B.A. Psychology at Duke University, North Carolina, USA. Post graduate studies in Psychology in USA. Research Associate at Institute for Educational Research and Studies, Tehran, Iran, 1967-8. Instructor of the English Language, Institute of Foreign Languages and University of Tehran, 1964-67. Edited the Quarterly Bulletin, PROGRESS, at Institute for Educational Research and Studies; conducted research projects and supervised student projects.

Lila Dehgani

Born 1939. B.Sc. Psychology, at Leeds University, England, also post graduate studies in Psychology in England. Research Associate and Supervisor of Psychology Laboratory, Institute for Educational Research and Studies, 1967-68. Instructor and Director at Pahlavi Foundation Child Guidance School, Tehran, Iran, 1965-66. Instructed psychology classes and directed test development and standardization for the Institute for Educational Research and Studies.

ITALY

Mauro Laeng

Born 1926. "Libero Docente", 1963, in Education. Formerly professor of History and Philosophy, Classical High School, Varese; presently Professor of Education, Department of Education, University of Rome. Consultant, "Centro Didattico Nazionale", Ministry of Education. Member, Association for Programmed Learning, London; National Council of Teachers of Mathematics, Washington; Italian correspondent of UNESCO Institute of Education. Author of 8 books and many essays mostly on epistemological problems and the teaching of sciences; works in the field of Comparative Education.

JAPAN

Shigeki Sakakibara - See Page 20.

Shigeru Shimada

Born 1916. Graduated from Tokyo Bunrika University in 1941. Teacher of Mathematics in a secondary school in 1941. Specialist in Mathematics Education in the Ministry of Education in 1948. Senior Researcher and Head of Mathematics Education Section of the Fifth Department of NIER.

Shigeo Kojima

Born 1927. Graduated from Tokyo University 1948. Post graduate course of Cytology in Tokyo University in 1951. Researcher in NIER, since 1951. Head of Science Education in the fifth department of NIER.

Michi Kagawa

Born 1923. Graduated from Women's Department of Tokyo College of Pharmacy, 1944. Member of the Staff in Institute of Physical and Chemical Research, 1944. Doctorate from Tokyo University, 1961. Associate Professor (Analytical Chemistry) of Tokyo College of Pharmacy. Senior Researcher of Science Education Section of the fifth department of NIER.

Tsutomo Ueshiba

Born 1929. Graduated from Tokyo University of Education, 1955. M.A. in Education from Tokyo University of Education, 1959. Teacher of Mathematics in the upper secondary school in 1959. Senior Researcher of Mathematics Education Section of the fifth department of NIER, 1965.

NETHERLANDS

Sjaak Sandbergen

Born 1936. Drs. in Psychology. Worked as an assistant in the department of Methodology at the University of Amsterdam, 1964 - 1967. Since 1967, has been working on the IEA Project. Is co-author of a book on measuring educational achievement and a number of articles in the field of testing and educational objectives. Interests: educational psychology, methodology and school psychology.

POLAND

Boleslaw Niemierko

Born 1935. Ph.D. at the University of Warsaw. Lecturer in Psychology and Education in a Teacher Training School, 1960. Research Adjunct in the Central Institute for Educational Research at the Ministry of Education. The author of a book "Success and Failure of the Teacher in his Work", and about 30 articles on teacher behaviour, statistical methods and organization of educational research.

SCOTLAND

G. J. Pollock

Born 1930. M.A. at Glasgow University, 1950, and M.Ed. at Manchester University in 1965. Depute Director of the Council for Education in Scotland. Teaching experience gained in schools, technical colleges, and a college of education. Also had experience in industry. Main research work is concerned with the problem of wastage in courses of further education which lead to national certificates in engineering and allied subjects.

SWEDEN

Robert Liljefors

Born 1939. Research assistant at the Institute for Educational Research, School of Education, Stockholm. Consultant at the National Swedish Road Safety Board, Section for Research on Information and Development, in connection with A national study of the efficiency of safety education and traffic instruction in schools. Has reported on a study of criminals in a population which has been followed for 26 years.

THAILAND

Somnuk Comurai

Born 1926. B.A. 1949, M.Ed. (Child Development), College of Education, Bangkok, 1958. A.I.E. (Child Development) Institute of Education, London, 1960. Senior Staff member, Bangkok Institute for Child Study. Thesis: Copy of Form Test; A Comparison of Parental Roles in the Upbringing of Young Children Based on London and Bangkok Samples.

together with:

Ravipan Somnapan

Born 1935. Ph.D. in experimental psychology at the University of Iowa, USA. Senior Research Fellow and Head, Division of Statistics and Computor Science; Head, Division of Experimental Psychology, Bangkok Institute of Child Study. Consultant to the Stanford Research Institute. Research Consultant, Duke University. Research Consultant, the Advanced Research Projects Agency, U.S. Office of the Secretary of Defense. Lecturer, Thammasart University, The College of Education, The National Institute of Development Administration. Systems Engineer, IBM Corp. 1963-67. Research staff member, Measurement Research Corporation - Iowa Testing Program 1960 - 63. Data Processing Assistant, Cosmic Radiation and Space Research Center 1959-60. Publications: Development of Sets of Mutually Equally Discriminable Random Shapes, Mathematical Properties of T Scores. Articles on motivation, reward, punishment, experimental research, and technical monograph on the transformation and identification of points on non-Euclidean coordinates. Member of Society of Sigma Xi, the Association for Computing Machinery, and the Midwestern Psychological Association.

UNITED STATES

Richard M. Wolf - See Page 17.

IEA NATIONAL SUBJECT AREA COMMITTEES

AUSTRALIA

Science

Convenor - Malcolm J. Rosier - See Page 55

Hugh D. Batten

B.Sc., B.Ed. Lecturer in Education, Monash University, Victoria. Eight years' teaching experience in biological sciences in secondary schools and teachers colleges.

Les G. Dale

B.Sc. B.Ed. Executive Officer, Junior Secondary Science Project, Australian Council for Educational Research. Twenty years' teaching experience in secondary school Science.

Gordon V. Jones

B.Sc. Dip.Ed. Head of General Science Department, Melbourne Church of England Grammar School. More than twenty years' teaching experience in secondary school Mathematics and Science in Australia, U.K. and U.S.A.

W.A.F. Lang

Dr. Phil. Senior Science mistress, Firbank Church of England Girls' Grammar School. Thirty years' teaching experience in secondary school Physics and Chemistry.

Vincent McKenna (Rev. Bro.)

B.A., B.Sc., M.Sc., Ph.D. Headmaster of St. Kenvin's College, Toorak. Twenty five years' teaching experience in secondary school Science. Member of Australian Commonwealth Gevernment Advisory Committee on Science Standards for Independent Secondary Schools.

Bernard Rechter

M.Sc., B.Ed., Chief Research Officer, Australian Council for Educational Research. Twelve years' teaching experience in secondary school Science. Federal Secretary of Australian Teachers' Association. Joint editor of Australian Science Teachers' Journal. Head, Test Development Division, A.C.E.R.

Mervyn L. Turner

B.Sc. B.Ed., M.A. Ed.D. Assistant to Director, Australian Council for Educational Research. In charge of general research, and test materials development.

Australian National Science Committee.

Noel Wilson

B.Sc. B.Ed. Senior Research Officer, Australian Council for Educational Research. Ten years' experience in secondary school Physics and Mathematics. Author of programmed course in matriculation physics.

State members (from State Education Departments)

Colin G, Harrison

B.A. (Hons.) Chief Curriculum Officer, Department of Education, Sydney. Many years' teaching experience in primary and secondary schools. Acting Chief Research Officer (examinations) in 1964-65. Member of N.S.W. Primary Natural Science Syllabus Committee and others. UNESCO expert in Curriculum Development in Jordan in 1965-66.

Douglas C. White

B.Sc. Dip.Ed. Curriculum Assistant, Curriculum and Research Branch, Education Department, Melbourne. Eleven years' teaching experience in primary, secondary and technical schools. Member of Victorian Primary Science Committee.

Barry McGaw

B.Sc., B.Ed. Senior Research Officer, Research and Curriculum Branch, Department of Education, Brisbane. Five years' teaching experience in science in secondary schools and teachers colleges. Member of examinations sub-committee for B.S.C.S. course in Queensland.

Douglas J. Anders

B.Sc., B.Ed., Dip.Ed.Admin., Dip.Teaching. Inspector of secondary schools, Education Department, Adelaide. Twenty-five years' teaching experience in Science. Chairman of Science Sub-Committee of South Australian Secondary Schools Curriculum Board.

Kenneth J. Betjeman

M.Sc., Dip.Ed. Acting Superintendent (Science) Secondary Education Division, Education Department, Perth. Eight years' teaching experience as secondary school Science teacher.

Lloyd D. Blazely

B.Sc., B.Ed. Superintendent of Research, Education Department, Hobart, Tasmania. Six years' teaching experience in secondary school Science and Mathematics. Four years' experience at Australian Council for Educational Research in test and curriculum development.

Australian National Committees.

Reading Comprehension

Convenor - Milton L. Clark

B.A., B.Sc. Assistant to Director, Australian Council for Educational Research. Seven years' teaching experience in primary and secondary schools.

J. Barnes (Mrs.)

B.A., Dip.Ed. Experience as research officer at National Foundation for Educational Research, London, and at Australian Council for Educational Research.

J. Maling (Miss)

B.A., Dip.Ed. Senior Research Officer, Australian Council for Educational Research. Three years' teaching experience in secondary school English.

William T. Renehan

B.A., B.Ed. Chief Research Officer, Australian Council for Educational Research. Twenty years' teaching experience in primary and secondary school, and teachers colleges.

BELGIUM

Research Director for IEA Projects: G. de Landsheere, Professor, University of Liège.

Chairman of the Belgian Commission for IEA: Mr. Vanbergen, Directeur Général de l'Organisation des Etudes at the Ministry of Education Brussels.

General Secretary of the Commission: Mr. Dupont.

Science

Coordinator - Fernand Hotyat

Head of the Centre de Travaux of Morlanwelz. Chairman of the School of Education of Mons.

Secretary - Mr. Dupont.

Mr. Lohisse

Inspecteur, Enseignement moyen.

Mr. Francois

Inspecteur, Enseignement moyen.

Mr. Jodogne

Inspecteur, Enseignement moyen.

Mr. Devos

Inspecteur, Enseignement technique.

Mlle. de Ridder

Inspectrice M.O.

Mr. Mielants

Inspecteur, M.O.

Mr. Gevers

Inspecteur M.O.

Mr. Faelen

Inspecteur T.O.

Abbé Navez

Inspecteur Enseignement libre.

Z. E. H. Kannunik Delaruelle

Enseigement libre.

Belgian National Subject Area Committees.

Reading Comprehension and Literature

Coordinator for the French Speaking part of the country - G. de Landsheere - See Page 9.

Professor, University of Liège.

Coordinator for the Flemish Speaking part of the country - A. de Block

Professor, University of Ghent.

Secretary - M. van Bockstal

Conseiller à l'Organisation des Etudes.

Mr. Verbist (Flemish)

Professor, University of Ghent.

Mr. Burion

Professor, University Center, Mons.

Mr. Swinnen (Flemish)

Professor, University of Louvain.

Mr. Benijts (Flemish)

Secretary, C.C.U.P.

Mr. Dubois

Assistant, University of Liège.

Mr. Gilmant

Inspecteur, général Enseignement Primaire.

Mr. Christiaens (Flemish)

Inspecteur, général Enseignement Primaire.

Mr. Collin

Inspecteur, Enseigement moyen.

Mr. Jaumain

Inspecteur, Enseignement moyen.

Mr. Gerardy

Inspecteur, Enseignement moyen.

Mr. Aertsens (Flemish)

Inspecteur, Enseignement moyen.

Belgian National Subject Area Committees - Reading Comprehension and Literature

Mr. Marissens (Flemish)

Inspecteur, Enseignement moyen.

Mr. Moermans (Flemish)

Inspecteur, Enseignement moyen.

Mr. Neuts (Flemish)

Inspecteur, Enseignement moyen.

Mr. Borgers

Inspecteur, Ecoles techniques.

Mr. Cotton

Inspecteur, Ecoles techniques.

Mlle. Halevez

Inspecteur, Ecoles techniques.

Mr. Declercq (Flemish)

Inspecteur, Ecoles techniques.

Mr. Ulens (Flemish)

Inspecteur, Ecoles techniques.

Mlle. Verhulst (Flemish)

Inspecteur, Ecoles techniques.

Z. E. P. Vanden Bossche

Hoofdinspecteur Vrij Onderwijs.

Mr. le Chanoine J. Van Camp

Inspecteur, Enseignement Libre.

Mrs. de Landsheere

Professor, Ecole Nòrmale de Liège.

Observers

Mr. Roger

Inspecteur Organisation Etudes.

Mr. Derivière

Conseiller-chef de Service.

CHILE

Science

Natalio Glavic

Professor of Methodology of Science at the Faculty of Philosophy and Education at the University of Chile.

*Eliana Díaz

Teacher of Chemistry and Biology.

*Teresa Segure

Teacher of Mathematics and Physics. Professor of Statistics at the School of Psychology of the University of Chile.

Reading Comprehension

*Lucy Bianchi

Teacher of English. In charge of the Verbal Reasoning Part of the Scholastic Aptitude Test the Institute prepares for selection purposes.

* Sybil Cleary

Teacher of English.

*Elisa Cassigoli

Teacher of History.

*Emilio Avila

Teacher of Spanish.

Miss Cleary, Miss Cassigoli and Mr. Avila are members of the Committee in charge of the Verbal Reasoning Part of the Scholastic Aptitude Test.

Literature

*Emilio Avila

Teacher of Spanish.

*Fernando Pérez

Teacher of Spanish with special studies on evaluation in Spain with Professor Mariano Yela.

English

Professor Lydia Miquel

Professor of Methodology of English as a Foreign Language,

(*Researchers at the Institute of Statistical Research.)

Chile National Subject Area Committees - English.

at the Faculty of Philosophy and Education at the University of Chile.

*Sybil Cleary

Teacher of English (Studies abroad)

*Carmen López

Teacher of English.

French

Hugo Acuna

Professor of French Phonetics at the Faculty of Philosophy and Education at the University of Chile.

René Charó

Professor of French at the Faculty of Philosophy and Education at the University of Chile.

*Olga Berdicewski

Psychologist, Professor of Theory of Test Construction at the School of Psychology at the University of Chile.

Civic Education

*Elisa Cassigoli

Teacher of History, Geography and Civic Education.

*Luis Menke

Teacher of History, Geography and Civic Education.

*Researchers at the Institute of Statistical Research.

Questionnaire and Scales

*Susana Navarrete

Psychologist and Teacher of English. M.A. at Minnesota University.

*Fernando Pérez

Teacher of Spanish.

*Luis Menke

Teacher of History, Geography and Civic Education.

ENGLAND

Science

Chairman - Mr. L. C. Comber - See Page 19.

Her Majesty's Inspector (retired)

Dr. M. Ashby

City of Portsmouth College of Education.

Miss E. M. Eastwood

Godolphin and Latymer School, W. 6.

Mr. J. Egglestone

Lecturer, University of Leicester School of Education.

Professor J. F. Kerr

University of Leicester School of Education.

Dr. J. E. Spice

Nuffield Foundation Science Teaching Project.

Mr. C. B. Spurgin

Senior Science Master, Wolverhampton Grammar School.

Reading Comprehension

Chairman - Mr. M. A. Brimer - See Page 21.

Head of Research Unit, University of Bristol Institute of Education.

(No formal committee set up, only a panel of consultants)

Literature

Chairman - Mr. J. N. Britton - See Page 23.

Professor in Education, University of London Institute of Education.

Mr. J. Dixon

Senior Lecturer in English, Bretton Hall College.

Professor B. Hardy

Professor of English, Royal Holloway College.

Miss N. Martin

Professor of English, University of London, Institute of Education.

English National Subject Area Committees - Literature.

Mr. D. W. H. Sharp

Lecturer in Education, University College of Wales.

Mrs. P. d'Arcy

Research Officer, University of London Institute of Education.

English

Chairman - Mr. E. G. Lewis - See Page 24.

Co-Director, Languages Project, Department of Education, University College of Wales.

Miss J. Derrick

University of Leeds, Institute of Education.

Professor M. A. K. Halliday

Head of Department of Linguistics, University College, London.

Mr. G. E. Perren

Director of Center for Information on Language Teaching.

Mr. S. P. Corder

Head of Department of Applied Linguistics, University of Edinburgh.

French

Chairman - Mrs. Clare Burstall - See Page 26.

Senior Research Officer, National Foundation for Educational Research in England and Wales.

Professor D. G. Charlton

Department of French, University of Warwick.

Mr. J. S. Jones

Her Majesty's Inspector.

Mr. A. Spicer

Nuffield Foundation Foreign Language Teaching Materials Project.

Dr. H. H. Stern

Reader, Language Center, University of Essex.

Mr. B. E. Thomas

Her Majesty's Inspector.

Civic Education

Chairman - Mrs. Charity James - See Page 28.

Director, Curriculum Laboratory, Goldsmiths College.

Mr. H. G. Macintosh

Deputy Director, Associated Examining Board.

Mr. P. G. Mauger

Head of Education Department, Coventry College of Education.

Dr. A. N. Oppenheim - See Page 17.

Reader in Social Psychology, London School of Economics.

Mr. P. Thomas

Her Majesty' Inspector, Department of Education and Science, Cardiff.

Mr. G. Whitmarsh

Senior Lecturer in History, City of Birmingham College of Education.

Mr. L. Smith

Director, Consultative Service, Curriculum Laboratory, Goldsmiths College.

FEDERAL REPUBLIC OF GERMANY

Science

Lothar Riemenschneider - See Page 56.

(With other consultants from different types of schools and the Technical University)

English

Dr. Reinhold Freudenstein

Secondary School Teacher. Member of the permanent staff of the Institute of Education at the University of Marburg.

Dr. Harald Gutschow

Consultant, Pädagogische Hochschule, Berlin.

Social Studies

Wolfgang Hilligen

Professor of Didactics of Social Studies, University of Gießen.

Manuael Zimmermann

Teacher, Research Assistant.

FINLAND

Science

Biology:
Esko Laulajainen M.S.

Head Instructor at the Normal School of Jyväskylä (Chairman)

Esko Kivistö M.S.

Instructor at the Normal School of Jyväskylä.

Otto Pöyhönen M.S.

Instructor, expert at a publishing company.

Chemistry, Physics:
Vesa Lyytikäinen Phil. lic.

Senior Inspector at the Central Board of Schools (Chairman)

Eero Laaksovirta M.S.

Instructor at a high school, Helsinki.

Esko Ranta M.S.

High School Science instructor.

Olavi Saarikivi M.S.

Instructor at a high school, Science.

Rolf Qvickström Phil. lic.

Head instructor at the Swedish Normal Lyceum in Helsinki.

C. G. Wolff M.S.

High school Science instructor at Tammisaari.

Reading Comprehension

Juhani Karvonen Ph.D. (E.D.)

Director for Center for Educational Research, Head of its Research Department.

Antja Lahtinen M.E.

Research assistant on language testing at the Center for Educational Research.

Literature

Vuokko Raekallio-Teppo M.A.

Head instructor at the Normal School of Jyväskylä.

Jenny Lilja M.A.

Lecturer in Literature at the Teacher Training Department University of Jyväskylä.

Vilho Viksten M.A.

Literary expert of a publishing company, former high school teacher in mother tongue and Literature.

English

Rauno Piirtola M.A. - See Page 25.

Lecturer in language didactics at the University of Jyväskylä (Chairman)

Jouko Räihä M.A.

Senior inspector at the Central Board of Schools.

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Sauli Takala B.A.

Research assistant on foreign languages teaching at the Center for Educational Research Jyväskylä.

Civic Education

Kai R. Lehtonen M.A.

Head instructor at the Helsinki Normal Lyceum (History and Civics)

IRAN

Science

Mr. Ahmad Aram

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Dr. Abdolkarim Charib

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Dr. Mahmood Najmabadi

Professor and Head of Chemistry Department, National Teachers College.

Dr. Mohsen Alavi Nejad

Professor and Head of the Physics Department, National Teachers College.

Mr. Pakravan

Secondary School Science Teacher.

Mr. Bozorgnia

Secondary School Science Teacher.

Mr. Mohsen Koushesh

Secondary School Science Teacher and Test Technician.

Dr. M. Behzad

Professor of Biology; Editor of Secondary School Science Textbooks.

Reading Comprehension

Mrs. Lily Ayman - See Page 21.

Director, Research and Studies Center, National Committee for Literacy Campaign.

Mrs. Tooran Mirhadi

Principal, Farhat Primary School.

Mr Yousef Ardabili

Head, Testing Division, State Organization for Administrative and Employment Affairs.

Mr. Manucher Mobasher

Secondary school teacher and Test Technician.

Literature

Dr. Z. Sajjadi

Professor and Head of Persian Language Department, National Teachers College.

Miss Tooran Mirhadi

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Miss Kita Tabari - See Page 58.

Research Associate, Institute for Educational Research and Studies.

English

Miss Kita Tabari - See Page 58.

Research Associate, Institute for Educational Research and Studies.

Mr. Abbas Horri

Director, National Institute of Languages.

Dr. Rahmat Haghdan

Director of Studies, National Teachers College.

Mr. Reza Bateni

Instructor of English Language.

Dr. Hormoz Milanian

Instructor of English Language.

Mr. Mohamad Ali Abidi

Director of Studies, National Institute of Languages.

French

Dr. H. N. Simai - See Page 27.

Professor and Head of Department of French Language, National Teachers College.

Dr. Ebrahim Hashemi

Professor of Psychology; Director, Teacher Training Institute, National Teachers College.

Dr. M Charib

Professor of French Language; Director of Language Laboratory, National Teachers College.

Civic Education

Dr. Mohammad Mashayekhi - See Page 29.

Professor of Education and Director, Institute of Management Training, National Teachers College.

Mr. Yousef Ardebili

Head, Testing Division, State Organization for Administrative and Employment Affairs.

Dr. Housein Tavakoli

Chief, Educational Projects, Central Bureau of Budget, Plan Organization.

ITALY

Science

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Mrs. Maria Ferretti

Part time Assistant, Department of Physics, University of Bologna. Professor of Mathematics and Physics, Scientific High School, Bologna. Member of group for Italian adaptation of PSSC, expert in objective assessment of educational achievement in physical sciences.

Mr. Leonardo Piracci

Professor of Electronics, Technical Institute, Velletri. Expert in objective evaluation of educational achievement in physical sciences.

Miss Lydia Tornatore

Principal, School "Pestalozzi", Florence. Research work and publications in education and evaluation of educational achievement in Mathematics.

Reading Comprehension

Mr. Domenico Parisi (Coordinator)

Research psychologist. Institute of Psychology, N.R.C Rome. Part time Assistant, Department of Education, University of Rome. Research work in psycholinguistics, educational psychology programmed instruction.

Miss Giovanna Barbieri

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Italian National Subject Area Committees - Reading Comprehension

Mr. Filippo Boschi

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Literature

Miss Melina Insolera (coordinator)

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Mr. Ignazio Baldelli

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English

Mr. Mario Ferencich (coordinator)

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Professor of English, Technical Institute, Rome. Director, of in-service training courses for teachers of English, Ministry of Education, Italian Center for American Studies, Rome.

French

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Employed at the Office for cultural exchanges, Ministry of Education, Rome, formerly Professor of French, Scientific High School, Rome, Professor of General Linguistics, University of Trento, Part time Assistant, Chair of Linguistics, University of Bologna, Consultant for radio and television courses of French.

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Civic Education

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JAPAN

Science

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Kunio Hirata

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Kaneo Ishigami

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Seishi Kaya

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Haruo Kinoshita

Professor of Biology in Tokyo University, leader in Science education.

Hideo Kobayashi

Teacher in the elementary school, leader in Science education.

Manabu Kobayashi

Specialist for Science education in the Ministry of Education.

Shigeo Kono

Associate Professor of education in Ochanomizu University, Consultant for educational background study.

Japanese National Subject Area Committees - Science

Nobuo Kojima

Science teacher in the lower secondary school, leader in Science education.

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Hisashi Kuno

Professor of Earth Science in Tokyo University, leader in Science Education.

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Masafumi Matsumura

Professor of Mathametics in Saint Sophia University, Consultant for statistics.

Toshio Mitsui

Science teacher consultant in Tokyo Bureau of Education.

Shigeichi Moriguchi

Professor of Mathematical Science in Tokyo University, Consultant for statistics.

Hisao Morikawa

Director of Science Department of Tokyo Institute for Education, leader in Science education.

Tetsujiro Morikawa

Science teacher in the lower secondary school, leader in Science education.

Minoru Nakajima

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Akinosuke Nomura

Associate Professor of Chemistry in Saint Sophia University, leader in Science education.

Japanese National Subject Area Committees. - Science

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Science teacher in the upper secondary school, leader in Science education.

Hideo Ohashi

Inspector for Science education in the Ministry of Education.

Shinroku Oshima

Science teacher in the upper secondary school, leader in Science education.

Jiro Ota

Associate Professor of Biology in Ochanomizu University. Leader in Science education.

Akio Otsuka

Director of Institute of Applied Optics.

Seizo Otsuko

Specialist for Science Education in Ministry of Education.

Riichiro Seki

Professor of Science education in Yokohama National University, leader in Science education.

Goro Shimogawara

Science teacher in the upper secondary school, leader in Science education.

Shiro Shigeno

Science teacher in the upper secondary school, leader in Science education.

Minoru Someya

Science teacher in the lower secondary school, leader in Science education.

Yasushi Suzuki

Researcher in Tokyo Institute for Education, specialist in Science education.

Japanese National Subject Area Committees. - Science.

Bunichi Tamamushi

Professor of chemistry in Tokyo Woman's Christian College, leader in Science education.

Bungo Wada

Professor Emeritus of Tokyo University, leader in Science education.

Takeo Yahagi

Teacher in the elementary school, leader in Science education.

Shigeaki Yamashita

Specialist of statistics for education in the Ministry of Education.

Takeo Yasuda

Science teacher in the lower secondary school, leader in Science education.

Ichi Yoshimoto

Associate professor in Tokyo University of Education, leader in Science education.

NETHERLANDS

Science

Biology Section

Chr. W. Hemker

Teacher of Biology in the Spinoza Lyceum in Amsterdam.

Drs. W. van der Lee

Teacher of Biology and careers guidance cousellor at the St. Igmatius College in Amsterdam.

Dr. A. Meesters

Teacher of Biology and deputy headmaster of the state lyceum in Amsterdam.

Dr. W. Postma

Teacher of Biology at the Montessou lyceum in Amsterdam.

Dr. P. Vermeulen

Teacher of didactics of Biology at the genetic institute in Amsterdam.

Miss Drs. G. Verberne

Teacher of Biology at the R.K. Pius X Lyceum in Amsterdam.

Dr. W. F. Schroevers

Officer on the Amsterdam Board of Natural History and the Foundation "Amsterdamse Schoolwerktuinen".

Physics Section

Dr. J. J. M. Reesinck

Teacher Emeritus of Physics in secondary schools.

Drs. C. Ris

Teacher of Physics at the Chr. Lyceum-Zuid, Amsterdam.

Drs. A. Wiewel

Teacher of Physics at the St. Ignatius College in Amsterdam.

Dutch National Subject Area Committees - Science

Chemistry Section

Dr. S. R. van Asperen de Boer

Teacher of Chemistry and Biology at the Hervormd Lyceum in Amsterdam.

Drs. A. Cohen

Teacher of Physics and Chemistry at the Montessou Lyceum in Amsterdam.

Drs. W. Davids

Teacher of Chemistry at the Casimirlyceum in Amsterdam.

Miss Drs. W. J. Hertogh

Teacher of Chemistry at the Roman Catholic lyceum, Fons Vitae, Amsterdam.

Miss Dr. M. E. A. de Jong

Teacher of Chemistry at the State lyceum for girls, Amsterdam.

Mrs. Drs. K. Zijp-Janmaat

Teacher of Chemistry at the Dr. Lely Lyceum in Amsterdam.

Reading Comprehension

Drs. C. J. Meyer

Teacher of Dutch and deputy headmaster at the R.K. Pius X lyceum in Amsterdam.

Mrs. E. Oomens de Haas

Teacher of Dutch at the St. Ignatius College in Amsterdam.

Miss A. van der Vlugt

Teacher of Dutch at the R.K. Fons Vitae lyceum for girls, Amsterdam.

Drs. H. Wesdorp

Teacher of Dutch at the Cartesius Lyceum.

Dutch National Subject Area Committees.

English

Miss Drs. A. Crevels

Teacher of Dutch at Het Amsterdams Lyceum, Amsterdam.

Miss E. M. Huis in 't Veld

Teacher of English at the R.K. Fons Vitae lyceum for girls, Amsterdam.

J. Steen

Teacher of English and German at the H.A.V.O. school in Amsterdam.

French

W. Gerritsen

Teacher of French at the Dr. Lely Lyceum, Amsterdam.

R. W. Geevers

Teacher of French at the H.A.V.O. school, Amsterdam.

Drs. J. van der Meulen

Teacher of French at the Cartesuis Lyceum, Amsterdam.

L. H. Nanninga

Teacher of French at the H.A.V.O. school, Amsterdam.

J. van Tuin

Teacher of French at the Jacob van Lennep School, Amsterdam.

H. Vos

Teacher of French at the Spinoza Lyceum, Amsterdam.

SCOTLAND

Science

W. R. Ritchie BSc (Chairman) - **See Page 20.**

HM Inspector of Schools. Member of IEA International Science Committee.

J. R. Barr BSc AInstP

Formerly Teacher in secondary schools. Advisor in Science to Edinburgh Education Committee.

D. E. Hoare M.A.PhD.FRIC

Reader in Physical Chemistry, University of Dundee. Leader of a group investigating teaching methods for Chemistry in the first year of Scottish University Courses.

A. W. MacKaill BSc. AHWC

Lecturer in Chemistry, Moray House College of Education, Hon. Lecturer in Chemistry, University of Edinburgh. Research in the nature and measurement of ability in Chemistry.

A. J. Mee OBE.M.A.BSc.FRIC.FRSE

HM Inspector of Schools. Leader of a team undertaking curriculum development in science in Scotland, Chairman of the Working Party for Secondary School Science, set up by the Scottish Education Department.

J. Park BSc.

Formerly principal examiner in biological subjects for the Scottish Certificate of Education Examining Board. Principal teacher of Biology, George Heriot's School.

J. Pearson BSc.

Teacher of Physics.

Elizabeth Perrott MSc. PhD.FLS.FInstBiol.

Formerly teacher of biology at schools and at University. Professor and Head of Department of Education, University of Stirling.

S. T. S. Skillen MSc.MInstBiol.FLS

Member of the Nuffield Ordinary and Advanced Level Consultative Committees. (Biology) HM Inspector of Schools.

Scottish National Subject Area Committees.

Reading Comprehension

W. A. Gatherer M.A. Ph.D. (Chairman)

HM Inspector of Schools.

J. Maxwell M.A. BE.d.

Principal lecturer in Psychology, Moray House College of Education, Edinburgh.

J. L. Powell M.A.Ed.B.

Assistant Director, Scottish Council for Research in Education.

Miss J. F. Reid M.A.BE.d.

Lecturer in the Department of Education, University of Edinburgh.

A.A.M. Robertson M.A.FEIS

Headmaster, Loanhead Secondary School.

French

W. Cunningham M.A.

In charge of development work in modern languages at primary, secondary and further education level. HM Inspector of schools.

J. W. Coulthard M.A.MEd.

Formerly teacher in french and german. Senior Lecturer in Psychology, Moray House College of Education.

A. S. Fulton M.A.MEd.PhD.

Formerly a teacher of modern languages in a secondary school. Head of the Modern Languages Department in Moray House College of Education.

M. M. McRae M.A.Dip.Ed.

Principal Lecturer in Modern Languages at Aberdeen College of Education.

G. M. Marshall M.A.

Principal teacher of Modern Languages, Boroughmuir School, Edinburgh.

J. Mitchell

Principal teacher of Modern Languages, North Berwick High School.

SWEDEN

Science

Sven Svensson M.A. (Chairman) - See Page 20.

Deputy Head, Science Department, School of Education, Stockholm.

Margaretha Dahlbom M.A.

Reader, Methods of Science Teaching, School of Education, Stockholm.

Sten Forselius Ph.D.

"gymnasieinspektör" at National Board of Education, Stockholm.

Sigvard Liljeborg M.A.

Reader in Chemistry at School of Education, Stockholm.

Reading Comprehension

Carl-Hugo Björnsson Ph.L. (Chairman)

Head, Division of Primary School Teachers, Pedagogical Center, Stockholm.

Sten Rönnberg Ph.L.

Reader, Educational Psychology, Stockholm.

Literature

John Hanson M.A. (Chairman)

Reader, Swedish Department, School of Education, Stockholm .

Solveig Lundgren M.A.

Reader, Swedish Department, School of Education, Stockholm.

Sten Rein Ph.D.

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Bo-Arne Skiöld M.A.

Teacher of Swedish, Secondary level, Stockholm.

Stig Starrsjö

Reader, Swedish Department, School of Education, Stockholm.

Swedish National Subject Area Committees.

English

Ian Dunlop M.A. (Chairman) - See Page 25.

Director of Study, British Center, Stockholm.

Hans Jalling Ph.L.

Director of Study, English Department, University of Stockholm.

Kurt Jemsby

Consultant on Teaching English in Primary Schools.

Sten Rönnberg Ph.L.

Reader, Educational Psychology, Stockholm.

Anders Slettengren M.A.

Consultant on Teaching English in the Primary School.

Olof Warme M.A.

"adjunkt" at Huvudnässkolan, Vänersborg.

French

Erland Kruckenberg Ph.L. (Chairman) - See Page 26.

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Rune Bergentoft M.A.

Reader, School of Education, Stockholm.

Anita Boström-Kruckenberg M.A.

Teacher of French, High School level, Stockholm.

Clara Westman-Ostrogorsky M.A.

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Civic Education

Sixten Marklund Ph.D. (Chairman) - See Page 28.

Head, Teacher Training Department, National Board of Education, Stockholm.

Sixten Björkblom Ph.D.

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Birger Bromsjö Ph.D.

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Teacher of Civics, High School level, Stockholm.

THAILAND

Science

Mr. Somchai Kongtongkum B.A.B.Ed.

Second grade official. Instructor, general science.

Mrs. Sutha Pijitkadeepol B.Ed.

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Mrs. Suntri Piriyakich M.S. (ED)

First grade official. Assistant Professor, Chemistry.

Mr. Prayong Pongtongcharoen M.S.

Second grade official. Instructor, Physics.

Mr. Ravi Sanguansup M.S. (ED)

First grade official. Instructor, general and physical science.

Mrs. Nida Sapianchiay Ph.D.

First grade official. Instructor, Chemistry.

Miss Waraporn Suravadi B.Sc.B.Ed.

Second grade official. Instructor, Biology.

Mr. Sa-Korn Trinandwan M.A.,M.A.T.

Second grade official. Instructor, Botany.

Reading Comprehension

Mrs. Malee Chaiprasit B.Ed.

Third grade official. Instructor, English.

Mrs. Chaviwan Chungchareon M.S. (ED)

Second grade official. School principal.

Mrs. Saowanee Indrabhakti M.A.

First grade official. Instructor, English.

Mrs. Kanda Na Thalang Ed.D.

First grade official. Assistant Professor, English.

Miss Kesorn Padungros M.A.

Second grade official. Instructor, English.

Miss Opal Wattha M.S.

First grade official. Assistant Professor.

Affective Measures and Questionniares

Miss Ladtongbai Bhapirom B.A.

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First grade official. Researcher and Lecturer, educational psychology and guidance.

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First grade official. Researcher and Lecturer, child development.

Mrs. Somnuk Comrai M.Ed.,A.I.E.

First grade official. Researcher and Lecturer, child development.

Mr. Preeja Dhunma Ed.D.

First grade official. Researcher and Lecturer, human development.

Mrs. Kanchana Hasitabhan Ed.D.

First grade official. Researcher and Lecturer, educational psychology.

Mr. Ong-Art Jiyajun B.Ed.

Second grade official. Technician, data processing.

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Second grade official. Technician, data processing.

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Second grade official. Researcher and Lecturer, psychology.

Miss Boonsri Pairatana B.Ed.

Third grade official. Librarian, library science.

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Second grade official. Researcher and Lecturer, guidance.

Thai National Subject Area Committees, Affective Measures and Questionnaires.

Miss Penkhae Prachonpachanuk B.Ed.

Second grade official. Researcher, school education.

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Second grade official. Researcher, developmental psychology.

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First grade official. Assistant professor, child development.

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UNITED STATES OF AMERICA

Science

Leopold E. Klopfer (Chairman)

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James V. de Rose

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Illa E. Podendorf

Chairman of Science Department, University of Chicago Laboratory Schools.

James T. Robinson

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